



University of Bradford eThesis

This thesis is hosted in [Bradford Scholars](#) – The University of Bradford Open Access repository. Visit the repository for full metadata or to contact the repository team



© University of Bradford. This work is licenced for reuse under a [Creative Commons Licence](#).

**AN EMPIRICAL INVESTIGATION OF INFORMATION
SYSTEMS SUCCESS**

S.A. HUSSEIN

PhD

UNIVERSITY OF BRADFORD

2009

AN EMPIRICAL INVESTIGATION OF INFORMATION SYSTEMS SUCCESS

An Analysis of the Factors Affecting Banking Information Systems
Success in Egypt

Safaa A. Hussein MSc

Submitted for the degree
of Doctor of Philosophy

School of Management
University of Bradford

2009

Abstract

Safaa A. Hussein

An empirical investigation of information systems success

Key words: Information Systems, Success, Banking Industry, Egypt.

Information technology (IT) plays an important role in contemporary organisations and this role continues to expand in scope and complexity and affects business operations dramatically. Advances in the IT industry have caused major changes in every industry sector. The banking industry is no exception and it has undergone a dramatic change over the past few decades. With the coming of the information age, IS investments are becoming increasingly important to banks' survival, growth and prosperity. IS managers are under increasing pressure to justify the value and contribution of IS expenditure to the productivity, quality and competitiveness of the organisation.

This study aims to propose a model which investigates the success of information systems in the banking industry in order to help bank managers to evaluate the success of their IS, to be able to develop these systems and to improve the performance of bank managers and employees. Given that the ultimate dependent variable for this research is individual impacts, DeLone and McLean (2003) updated IS success model is leveraged and extended in this research.

The study proposes a research model which is guided by the decision to select a suitable number of key potential demographic and situational variables, in addition to the adoption of DeLone and McLean (2003) updated model. This model proposes that a variety of factors were found to affect IS success in general, however, from the socio-technical viewpoint, IS success should capture both technological and human elements. Therefore, an effective Banking Information System (BIS) typically requires an appropriate combination of both. As such, Thus, the technological dimensions (i.e. system, service and information quality) and the human dimensions (e.g. user satisfaction, perceived system benefits, user involvement, user training, age, education and system use) can be a good starting point when considering suitable constructs for measuring BIS success.

The research methodology of this study involved interviews with BIS practitioners and professionals to shape and refine the research model. Further, questionnaire survey was employed to collect data from bank managers in Egyptian banks. Structural Equation Modelling (SEM) using Partial Least Square (PLS) was used to test the research model.

Three research models were proposed according to age groups and initial results from PLS analysis reported different results in each research model. Findings indicated that system, information and service quality, level of training, age, length of system use, user involvement and top management support were the main predictors (success constructs) of user satisfaction and individual impacts in the three proposed research models. However, the relationships between these constructs varied according to each age group of managers.

The study offers important academic and practical contributions. Firstly, as a contribution to research, the study serves to extend the DeLone and McLean (2003) IS success model by introducing some key human and situational dimensions and

confirming certain links in that model with the context of banking industry. The contribution to practice is especially relevant for bank CIOs, software designers and developers looking for ways to improve BIS developments by providing them with directions regarding the BIS success dimensions that should be considered to encourage bank managers to adopt and be more satisfied with BIS which in turn influence their job performance.

Acknowledgements

I am forever grateful to Allah

During my lengthy and challenging journey towards completion of the doctorate, I have learned many valuable lessons. These lessons, though not all were pleasant at the time, definitely helped me to understand the nature of doctoral training and appreciate the true essence of conducting serious professional research. Beyond these valuable lessons, I eagerly acknowledge my indebtedness to the many individuals who have made this thesis possible.

First and foremost, my husband, Abd-Elrahman Mowafi, deserves my deepest thanks and respect for his continued support, patience, and tolerance during completion of this dissertation. His genuine concern, loving affection, and invaluable assistance were essential to the ultimate success of this undertaking.

Of primary importance to me within the academic context was Prof. Margaret Taylor, my supervisor, to whom I would like to express my sincere appreciation and gratitude for her calm, honest approach to research and life. The high degree of cooperation and ease of accessibility that characterised my interaction with her were truly commendable at all stages of this work's preparation. Without her steadfast encouragement and clear guidance, this thesis could not have been completed. And I certainly cannot fail to acknowledge her timeliness in returning the many preliminary draft versions.

I would like to express particularly warm thanks to Prof. Andrew Taylor, my second supervisor, for expending time and effort to guide and assist me throughout the thesis process and for his ideas and his always pushing for this project to be better. His knowledge and direction enabled the completion of this thesis.

It would be remiss of me not to offer an expression of deep appreciation to my other committee members, namely Dr David Allen, Leeds University, and Dr Zahid Hussain, Bradford University.

I would like to express my sincere gratitude to Dr. James Wallis for his invaluable help during the statistical analysis. Through countless hours' visits to his office, new analytical techniques were tried that shed a great deal of light on this thesis.

I would like to thank Mr Rashid, computer advisor at the School of Management Bradford University, for his help in writing this thesis.

I would like to acknowledge the academic and other staff who helped with all my doctoral programme work and special thanks go to Dr. Deli Yang and Mrs Chris Barkby.

Thanks, also, to my many English friends who have helped me to learn about, and to appreciate, their culture.

I regretfully cannot thank each member of the 25 Egyptian banks who participated in this study. Your candour, time and directness made this study possible. To each of you through this veil of confidentiality, I express my gratitude.

I would like to express my grateful thanks to the Egyptian Higher Education Ministry for sponsoring me during the last four years and to the Egyptian Educational Bureau for their support and encouragement during the completion of this thesis.

My first and last thoughts will always be my parents. I offer, bowing in humility before them, my dutiful and filial respects to my honourable father and mother. And finally, I express my devoted appreciation and love to my children Kareem and Reem for their understanding and support during this doctoral programme.

Dedication

I would like to dedicate this research to my family and parents. I am truly blessed to have had such wonderful and loving family, Abdel, Kareem and Reem. Without your support and encouragement during my doctoral programme, I would not have reached this point.

Table of Contents

Abstract	i
Acknowledgements	iii
Dedication	v
List of figures	x
List of tables	xi
List of abbreviations.....	xiii
1 Introduction and research summary	- 1 -
1.1 Preamble.....	- 1 -
1.2 Background	- 2 -
1.3 Research problem and contribution to current knowledge	- 4 -
1.4 Research Objectives	- 7 -
1.5 Research hypotheses	- 9 -
1.6 Research significance.....	- 11 -
1.6.1 Theoretical or academic perspective	- 11 -
1.6.2 Practical or industry perspective	- 11 -
1.7 Research scope	- 11 -
1.8 Thesis structure	- 12 -
2 Review of banking industry profile	- 14 -
2.1 Introduction.....	- 14 -
2.2 Banking industry	- 15 -
2.3 Change in banking sector	- 18 -
2.3.1 External forces.....	- 19 -
2.3.2 Internal forces.....	- 19 -
2.4 Global banking industry	- 20 -
2.5 Economic profile in Egypt	- 22 -
2.5.1 Economic environment.....	- 23 -
2.5.2 Economic performance.....	- 24 -
2.6 Banking industry in Egypt profile.....	- 28 -
2.6.1 Factors affecting Egyptian banking industry.....	- 32 -
2.7 Role of IT in Egyptian banking industry.....	- 35 -
2.8 Impact of IT on Egyptian banking system	- 41 -
2.8.1 Impact of IT on bank management.....	- 42 -
2.8.2 Impact of IT on customer services	- 42 -
2.8.3 Impact of IT on bank performance	- 43 -

2.9 Summary	- 43 -
3 Literature Review	- 45 -
3.1 Introduction	- 45 -
3.2 Information systems /Information technology (IS/IT)	- 47 -
3.3 Overview of IS success	- 50 -
IS failure	- 52 -
3.3.1 Theoretical development path of DeLone and McLean (1992) Model	- 58 -
Additional variables of proposed research model	- 62 -
3.4 IS success research	- 65 -
3.5 Research on IS success in banking industry	- 79 -
3.6 Dimensions and variables of proposed research model	- 85 -
3.6.1 System Quality	- 86 -
3.6.2 Information Quality	- 90 -
3.6.3 Service Quality	- 92 -
3.6.4 System Use	- 96 -
3.6.5 User Satisfaction	- 99 -
3.6.6 Individual Impact	- 101 -
3.6.6 Age	- 108 -
3.6.7 Organisational level	- 109 -
3.7.3 Length in job	- 111 -
3.6.8 Education	- 112 -
3.6.9 Length of system use	- 113 -
3.6.10 Training	- 114 -
3.6.11 User involvement	- 115 -
3.6.12 Top management support	- 118 -
3.7 Summary	- 123 -
4 Research Methodology	- 124 -
4.1 Introduction	- 124 -
4.2 IS professionals' interviews	- 125 -
4.2.1 Telephone- based interviews	- 125 -
4.2.2 Semi-structured interviews	- 127 -
4.2.3 The process of semi-structured telephone interviews	- 128 -
4.2.4 Analysis of telephone interviews	- 129 -
4.3 Revised Proposed Model	- 136 -

4.4 Approach of study (Epistemological approach).....	- 137 -
4.5 Type of study	- 142 -
4.6 Research study design.....	- 144 -
4.6.1 Historical research design.....	- 146 -
4.6.2 Experimental research design.....	- 147-
4.6.3 Non-experimental research design	- 146 -
4.6.3.1 Quantitative research	- 147 -
4.6.3.2 Qualitative research	- 147 -
4.7 Research study plan.....	- 148 -
4.8 Data collection methods.....	- 152 -
4.9 Pilot study and questionnaire translation	- 157 -
4.10 Research model operationalisation	- 163 -
4.11 Research sampling design	- 190 -
4.12 General outline plan for questionnaire survey data analysis.....	- 195 -
4.13 Summary	- 197 -
5 Data Analysis	- 198 -
5.1 Introduction.....	- 198 -
5.2 Respondents' characteristics	- 198 -
5.2.1 Gender, Age and Education.....	- 198 -
5.2.2 Professional characteristics	- 199 -
5.3 Revised proposed model and research hypothesis	- 204 -
5.4 Analysis of demographic variables	- 209 -
5.5 Hypotheses' testing procedures	- 214 -
5.5.1 Overview of SEM.....	- 214 -
5.5.2 Why SEM?	- 215 -
5.5.3 Why PLS path modelling?	- 217 -
5.5.4 Stages in PLS path modelling	- 218 -
5.6 Data analysis using PLS.....	- 219 -
5.6.1 Assessment of measurement model	- 220 -
5.6.2 Assessment of structural model.....	- 221 -
5.7 Data analysis for three research models using PLS	- 222 -
5.8 Data analysis for research model using correlation analysis	246
5.8.1 Relationship between age and user satisfaction	246
5.8.2 Relationship between educational level and user satisfaction.....	248

5.8.3 Relationship between length of system use and user satisfaction	249
5.9 Summary	251
6 Findings and discussion	252
6.1 Introduction	252
6.2 Findings.....	255
6.2.1 Research model 1	255
6.2.2 Research model 2	271
6.2.3 Research model 3	281
6.3 Comparison between the three IS success age group models.....	289
6.4 Implications of findings for the banking industry.....	295
6.4 Summary	300
7 Conclusions, Contributions, Limitations and Future Research.....	301
7.1 Introduction	301
7.2 Conclusions.....	301
7.3 Contributions and implications of study	305
7.3.1 Academic contributions.....	305
7.3.2 Methodological contributions.....	308
7.3.3 Implications of study	309
7.4 Limitations of study	311
7.5 Future research	313
References	316
Appendices.....	363
Appendix A: English version of questionnaire	363
Appendix B: Arabic version of questionnaire	371
Appendix C: Questions for IS practitioners of Egyptian banks	378
Appendix D: Letter of approval from Faisal Islamic Bank.....	380
Appendix E: Letter of approval from Cairo Barclays Bank.....	381
Appendix F: Letter of approval from HSBC Bank	382
Appendix G: Letter of approval from National Bank of Egypt.....	383
Appendix H: Letter of approval from Cairo Bank	384
Appendix I: Letter of approval from Misr Bank	385

List of figures

Figure 2.1: Fragmentation of banking industry value

Figure 2.2: Structure of Egyptian banking system (source: CBE, 2007)

Figure 3.1: Shannon and Weaver communication theory (Shannon & Weaver, 1949)

Figure 3.2: DeLone and McLean model of IS success (DeLone and McLean, 1992)

Figure 3.3: Updated IS success model (DeLone and McLean, 2003)

Figure 3.4: Proposed model of IS success (Seddon & Kiew, 1994)

Figure 3.5: Proposed research conceptual model

Figure 4.1: Revised proposed research model

Figure 5.1: Final research model

Figure 5.2: Structural model (mod11) evaluated with PLS graph

Figure 5.3: Structural model (model 2) evaluated with PLS graph

Figure 5.4: Structural model (model 3) evaluated with PLS graph

Figure 6.1: Research model 1

Figure 6.2: Relationship between dimensions of BIS success model for young bank managers

Figure 6.3: Research model 2

Figure 6.4: Relationship between dimensions of BIS success model for middle age bank managers

Figure 6.5: Research model 3

Figure 6.6: Relationship between dimensions of BIS success model for older bank managers

List of tables

- Table 2.1: Global banks' market share, by value 2007 (Data monitor, 2007)
- Table 2.2: Egypt's Key facts (CBE, 2008)
- Table 2.3: Real GDP (US \$ billions) 1990-2006 (Data monitor, 2007)
- Table 2.4: Real GDP CAGR 2002-2006 and forecast CAGR 2006-2010 comparison (Data monitor, 2007)
- Table 2.5: Real GDP forecast (US \$ billions) 2006-2010 (Data monitor, 2007)
- Table 2.6: Groups of Egyptian banks (CBE, 2008)
- Table 2.7: Regional comparison of Internet world usage (Ali, 2004)
- Table 2.8: Egyptian banks licensed to carry out e-banking (CBE, 2008)
- Table 3.1: Definitions of IT
- Table 3.2: Definitions of IS
- Table 3.3: DeLone and McLean's adoption of communication theory (Ballantine et al., 1996)
- Table 3.4: Summary of main studies of IS success
- Table 3.5: Studies of IS success in banking field
- Table 3.6: Summary of relationships between some demographic and situational variables and variables of ISs' success (Elnady & Elkordy, 1997)
- Table 4.1: Differences between quantitative and qualitative research (Neuman, 2000)
- Table 4.2: Questionnaires distribution and response rate for 25 banks
- Table 4.3: Measures of system quality
- Table 4.4: Measures of information quality
- Table 4.5: Measures of system use
- Table 4.6: Measures of user satisfaction
- Table 4.7: Measures of individual impacts
- Table 4.8: Measurement instrument of study variables
- Table 4.9: Sample distribution by organisational level
- Table 5.1: Respondents' personal characteristics
- Table 5.2: Job titles
- Table 5.3: Professional characteristics
- Table 5.4: Training level and user involvement
- Table 5.5: System usage
- Table 5.6: Number of tasks performed

Table 5.7: Number of packages used
Table 5.8: Age profile
Table 5.9: Educational level
Table 5.10: Individual reliability of reflective indicator loadings (Model 1)
Table 5.11: Initial & final number of items (Model 1)
Table 5.12: Composite reliability & coefficient convergent validity (Model 1)
Table 5.13: Correlation of variables (discriminant validity) (Model 1)
Table 5.14: Summary of PLS graph results (Model 1)
Table 5.15: Individual reliability of reflective indicator loadings (Model 2)
Table 5.16: Initial & final number of items (Model 2)
Table 5.17: Composite reliability & coefficient convergent validity (Model 2)
Table 5.18: Correlation of variables (discriminant validity) (Model 2)
Table 5.19: Summary of PLS graph results (Model 2)
Table 5.20: Individual reliability of reflective indicator loadings (Model 3)
Table 5.21: Initial & final number of items (Model 3)
Table 5.22: Composite reliability & coefficient convergent validity (Model 3)
Table 5.23: Correlation of variables (discriminant validity) (Model 3)
Table 5.24: Summary of PLS graph results (Model 3)
Table 5.25: Pearson's correlation matrix of age and user satisfaction
Table 5.26: Pearson's correlation matrix of education and user satisfaction
Table 5.27: Pearson's correlation matrix of length of system use and user satisfaction
Table 5.28: Summary of hypothesis testing
Table 6.1: Comparison between the three age groups in terms of success variables

List of abbreviations

IS	Information System
IT	Information Technology
BIS	Banking Information System
CBIS	Computer-based Information System
ICT	Information and Communication Technology
CEO	Chief Executive Officer
CIO	Chief Information Officer
ROI	Return on Investments
CAGR	Compound Annual Growth Rate
CBE	Central Bank of Egypt
GDP	Gross Domestic Product
OECD	Organisation for Economic Co-operation and Development
FDI	Foreign Direct Investment
IMF	International Monetary Fund
EU	European Union
EFTPOS	Electronic Funds Transfer at Point of Sale
ATM	Automated Teller Machine
ERP	Enterprise Resource Planning
CRM	Customer Relationship Management
HRMS	Human Resource Management System
EBI	Egyptian Banking Industry
CRIS	Credit Risk Information System
BEA	Bureau of Economic Analysis
SST	Social Studies of Technology
OCAM	Office, Computing and Accounting Machinery
IPE	Information Processing Equipment
IDPM	Institute of Development Policy and Management
MIS	Management Information System
SERVQUAL	Service Quality
OC	Organisational Computing
UDA	User-developed Application
ISFS	Information System Functional Scorecard
KMS	Knowledge Management System
OLS	On-line Learning System
CIS	Centralised Identification System
B2C	Business to Customer
TAM	Technology Acceptance Model
ITU	Intention to Use
CES	Customer E-commerce satisfaction
EC	Electronic Commerce
EG	Electronic Government
EUCS	End-user Computing Satisfaction
OMIS	Organisational Memory Information System
MBNQA	Malcolm Baldrige National Quality Award
DSS	Decision Support System
EIS	Executive Information System
ISD	Information System Development
TMS	Top Management Support

CSFs	Critical Success Factors
SEM	Structural Equation Modelling
PLS	Partial Least Square
ANOVA	Analysis of Variance
CBSEM	Covariance-based Structural Equation Modelling
AVE	Average Variance Extracted
ES	Enterprise System

Chapter 1

Introduction and research summary

1.1 Preamble

This study investigates the measurement of information system (IS) success. Its objectives are to propose a conceptual model that can be used to assess the success of information systems (ISs) in the banking sector in Egypt and to extend the updated DeLone and McLean (2003) IS success model.

Organisations continue to increase spending on IS and their budgets continue to rise (Kanaracus, 2008). However, fears about economic conditions and increasing competition create pressures to cut costs, which require organisations to measure and examine the benefits and costs of IS. By their nature, organisations are interested in knowing the return on these investments. The impacts of IS are often indirect and influenced by human, organisational and environmental factors, therefore, measurement of IS success is both complex and elusive (Petter et al., 2008).

Information systems (IS) play an important role in contemporary organisations and this role continues to expand in scope and complexity and affects business operations dramatically. IS are of critical importance to most organisations for many reasons: they are basic to most business process, they are integral parts of many products and services, they support decision making at the operational and strategic level and whole industry sectors depend heavily on them for their very existence (Guimaraes et al., 2009). Therefore, the quality and success of something so important should to be assured. IS success is thought to be an important motivating factor for people to use their systems and derive any benefits essentials for organisations to gain a return on their investments (Seddon, 1997; Rai et al., 2002).

The business community is interested in IS success research developments because IS investments comprise a large portion of their annual capital budget. Due to the high cost of IS development, investment decisions must be both objective and rational, while assuring success. Measuring the effectiveness of IS consistently ranks in the top ten issues of systems management (Sethi & King, 1994).

The banking industry like any other service industry has undergone a dramatic change over the past few decades. As banks had invested billions of dollars on IS over the last decade, there was much debate regarding the benefits accruing from these expenditures. Therefore, this thesis seeks to study factors which affect the success of ISs in the banking industry. More specifically, this study will propose a conceptual model which investigates banking information systems' success (BISs) by examining IS success model and extending previous work by considering some situational and demographic variables.

1.2 Background

For decades, researchers developed rich streams of research attempting to identify factors that lead to successful use of IS. One well known stream is the IS success literature. Because the productivity of employees would depend on the quality of the systems serving them, management decisions about IS are critically important to the prosperity and survival of a firm. Obtaining value from IS is important for organisations to flourish in the highly competitive economy of the twenty-first century (Lucas, 1999). However, investments in IS are a good thing but firms that choose to invest in IS should believe there will be a positive return from their investments (Lucas, 1999).

As the growing power of IS makes possible new services of great economic value, e.g. credit cards, overnight package delivery, and worldwide reservation systems are a few examples of services based on new IS. Therefore, information and the technology that delivers it would become critical and strategic resources for business firms and their

managers. Consequently, the higher the quality of the IS, the more the employees and managers would be productive and efficient. But what is an IS?

An IS can be defined technically as a set of interrelated components which collect (or retrieve), process, store and distribute information to support decision making and control in an organisation, which may also help managers and workers analyse problems, visualise complex subjects and create new products.

In the 1990s, the world witnessed an unprecedented expansion of business into global markets. IS was the major enabler which helped organisations to integrate their worldwide operations, as the effective use of IS was of vital importance to organisations in achieving economies of scale as well as competitive advantage, which are critical in today's worldwide markets (Roche, 1992; Kedia & Bhagat, 1991).

The late 1990s and early 2000s is an era dominated by developments in IS and associated work practices. The constant growth and succession of computer-based IS (CBIS) led many organisations and economies to transform themselves (Sharif et al., 2004). There were massive acquisitions of IS by organisations throughout the world. Many organisations in all sectors were converting to new modern technology, particularly information and communication technologies (ICTs), to gain competitive advantages (Sharif et al., 2004). Organisations frequently allocated substantial sums of money to adopt, implement, manage and integrate IS with organisational activities to provide better products and/or services; governments also allocated billions of dollars to build infrastructures to support the reliable transfer and efficient management of information (Al-Gahtani, 2004). This may be viewed as an exercise in innovation, since adopting any technology tends to change the associated work practices, and often necessitates a redesign of the human activity systems in which the technology is embedded: the organisation's IS.

In 1996, global investment in IS was estimated to be around US \$11 trillion (Strassmann, 1997; Brynjolfsson & Hitt, 1998). ISs assets can account for more than 50% of business capital spending (Nolan & McFarlan, 2005). Yet senior managers have questioned whether proposed savings in IS investment materialise (Advisory Board Company, 1997). Most organisations are not generating maximum value from IS investments (Ross & Weill, 2002).

Assessing the return on this large investment in IS management is of great importance to the global business community. For this reason, IS success and effectiveness as a field of research has gained in importance and attracted researchers from a variety of disciplines.

The motivation for this research is driven by evidence that indicates that the ability of an organisation to compete effectively in a global economy depends in part on the effectiveness of the IS function and its global orientation (e.g., Karimi & Konsynski, 1991). IS, however, may not be accepted and used by those for whom the systems were designed and implemented (e.g., Davis et al., 1989). Research findings suggest that IS problems are country-specific and are related to the country's unique political, legal, economic and technological environments (e.g., Deans et al., 1991; Ein-Dor, Segev & Orgad, 1993). Thus effective management of such systems requires identifying the issues which might be unique to certain cultures (Deans & Ricks, 1991; Palvia & Saraswat, 1992). The investigation of IS issues in a particular area of the world (e.g., Hassan, 1994 who investigated the environmental constraints in utilising information technology in Pakistan) emphasises the possible impact of cultural differences on such issues (Wetherte, Vitalari & Milner, 1994).

1.3 Research problem and contribution to current knowledge

Advances in the IS industry have caused major changes in every industry sector. The banking industry is no exception and it has undergone a dramatic change over the past

few decades. With the coming of the information age, IS investments are becoming increasingly important to banks' survival, growth and prosperity (Meng & Lee, 2007).

IS practitioners are under increasing pressure to justify the value and contribution of IS expenditure against the productivity, quality and competitiveness of the organisation (Byrd & Marshall, 1997). IS success is one of the most enduring research topics in the IS field, implying that measuring the success of IS activity is a difficult task. As successful IS becomes a key issue in many sectors, it becomes more important, however, in financial services because the financial sector is an information intensive sector. As IS support starts to encompass the range of operational and decision-making activity and as IS budgets grow, resources allocation challenges IS managers and reliable methods to assess IS effectiveness and to identify the factors affecting its success are of great importance (Miller & Doyle, 1987). DeLone and McLean (1992) argued that if IS research is to make a contribution to the world of practice, a well-defined measure is essential.

The Egypt IS market's position within the Middle East and Africa region is on the rise, with average growth of 16% expected through to 2013 and opportunities in most sectors. Overall IS market size is expected to increase from US\$1.2bn in 2008 to around US\$2.5bn in 2013 (Egypt IT report, 2009). The ongoing implementation of Egypt's banking sector reform plan continues to provide opportunities for IS vendors. The Central Bank of Egypt's announcement that it was to modernise its information technology infrastructure as a basis for a reform of work practices through the application of IS was one major driver.

The banking sector in Egypt has traditionally suffered from low profitability and poor asset quality, creating a significant opportunity for the application of IS. However, more recently, Egypt have been praised for its implementation of banking reforms and the application of best-practice in a number of fields, including IS.

Consequently, the current study seeks to propose a model which can be used to examine the success of BISs in order to help bank managers to evaluate the success of their IS, to be able to develop these systems and to improve the performance of bank employees.

Therefore, this study contributes to the conceptual side of BISs by proposing a model which can be used to examine the success of IS in the banking industry, a subject not investigated before. Also, it contributes to the practical side of BISs. As an important and significant challenge, it involves how to evaluate the success of IS, how to justify the different resources or investments allocated to these systems, and try to ensure the success of IS in positively affecting individuals.

From an industry perspective, the current study helps the managers of the banks to improve the likelihood of IS success by carefully considering the independent and dependent variables in the proposed model in IS development and implementation. While some of the variables (e.g. employees age, organisational level) cannot be directly controlled, other variables (e.g. information quality, system quality, service quality) can be. Plans should be developed to facilitate the development of more successful IS applications.

In addition, this research will provide new insights into factors which affect the success of BISs in Egypt. The diffusion of IT in many less-developed countries in regions such as Africa, Asia and Latin America has been extremely low (Igbaria et al., 2002). With increasing global trade, many of these countries are beginning to recognise the importance of IS. However, the mere adoption of it by organisations does not necessarily confer on them the benefits which could only result from its effective usage. Studies have shown that many ISs are under-utilised and hence do not make a significant contribution to improving the performance of employees and/or organisations using them (Igbaria et al., 2002). This is important, since the variables of

the proposed conceptual model in this study have previously been measured and tested mainly in the USA, Western and European countries. But a measurement of IS success in the banking industry in Egypt has not been conducted before. As a review of IT acceptance literature (e.g. Igbaria, 1993; Straub, 1994) indicated, most empirical evidence was collected in North America, using American subjects. Since an important concern in scientific research is external validity and a key dimension of external validity is international, despite these concerns studies addressing issues related to the usage and measurement of IS in less-developed countries are scarce (Igbaria et al., 2002). However, the selection of the Egyptian banking industry from the whole banking industry was based on convenience reasons and the ability to gain access to this industry's population for the field part of the study; the conceptual proposed research model can be applied to any other banking industry and any country.

1.4 Research Objectives

The primary goals of this research are to more clearly determine the extent to which the proposed model of IS success holds in the specific context of the banking industry. In the light of the apparent paucity of research on IS success in the banking industry, this study aims to achieve the following research objectives:

1. To establish the factors that lead to information system success in banking industry.

The banking industry like any other service industry has undergone a dramatic change over the past few decades (Sharif et al., 2004). As banks had invested billions of dollars on information systems over the last decade (Al-Gahtani, 2004), there was much debate regarding the benefits accruing from these expenditures. IS practitioners are under increasing pressure to justify the value and contribution of IS expenditure against the productivity, quality and competitiveness of the organisation (Byrd & Marshall, 1997).

Therefore, this research seeks to study factors which affect the success of ISs in the banking industry. More specifically, this study will propose a conceptual model which investigates banking information systems' success (BISs) by examining IS success model and extending previous work by considering some situational and demographic variables.

2. To investigate the different information systems models.

Previous IS researchers have attempted to test and validate different IS success models (e.g. McGill et al., 2003; Garrity & Sanders, 1998; Glorfeld, 1994; Igbaria & Tan, 1997; Rai et al, 2002; Seddon, 1997; Seddon & Kiew, 1994; Teo & Wong, 1998; Wixom and Watson, 2001). However, the focus to analyse IS was on mostly technical aspects. Those IS success models failed to go too far beyond technical rationales and analyse success in multi-level aspects such as organisational, socio-technical and process-based. Previous research has been conducted on why systems fail or succeed. In these studies, social issues in IS development were important (Hussain & Flynn, 2004) and a key ingredient for successful systems was the relationship or involvement of the users and system designers in the system development process (Coe, 1998) and the lack of attention to these can result in IS failure. Therefore, this research focuses on success measurements, from the socio-technical viewpoint, which should capture both technological and human elements (Garrity & Sanders, 1998).

3. To operationalise DeLone and McLean information system (2003) model and propose suitable amendments to it.

Although DeLone and McLean proposed a causal IS success model, it clearly needed further validation before it could serve as a basis for the selection of appropriate IS measures. In addition, researchers had to choose several appropriate success measures based on the objectives and the phenomena under investigation, as well as consider

possible relationships among the success dimensions when constructing the research model. Therefore, this study selected some demographic and situational variables that are expected to have an effect on system usage and user satisfaction as intermediate variables between those variables and the user work out-put to be added to the DeLone and McLean (2003) IS success model as possible determinants of BIS success. The selection of these variables was based on the existence of literature supporting their relevance as likely determinates of system success.

4. To make suitable recommendations to Egyptian banking industry to benefit from the use of information systems.

This study will provide new insights into factors which affect the success of banking information systems in Egypt and will also provide guidelines for Egyptian bank managers and practitioners in designing, adopting and implementing IS. It will also provide guidance in diagnosing the problems of the ongoing and current IS and proposing solutions to improve their effectiveness.

1.5 Research hypotheses

In order to address the research objectives, a research model will be presented in Chapter 5. Given that the ultimate dependent variable for this research is individual impacts, the latest DeLone and McLean's (2003) IS success model is leveraged and extended in this research.

The research hypotheses are developed and modified more than once during the progress of this research. However, on the basis of the latest revision of the proposed model, resulting in the following hypotheses on the relationships between the different variables, the last versions of the hypotheses are introduced here:

H1a: There is a positive relationship between perceived system quality and user satisfaction.

H1b: There is a positive relationship between perceived system quality and individual impacts.

H2a: There is a positive relationship between perceived information quality and user satisfaction.

H2b: There is a positive relationship between perceived information quality and individual impacts.

H3a: There is a positive relationship between perceived service quality and user satisfaction.

H3b: There is a positive relationship between perceived service quality and individual impacts.

H4: There is a negative relationship between user's age and user satisfaction.

H5: There is a positive relationship between user's educational level and user satisfaction.

H6: There is a positive relationship between length of system use and user satisfaction.

H7: There is a positive relationship between training level and user satisfaction.

H8: There is a positive relationship between user involvement and user satisfaction.

H9: There is a positive relationship between top management support and user satisfaction.

H10: There is a positive relationship between user satisfaction and individual impacts.

1.6 Research significance

The importance of this study is at both theoretical and empirical levels, as follows:

1.6.1 Theoretical or academic perspective

From an academic perspective, the study is an original attempt to establish a conceptual model and its dimensions to outline the factors which affect IS success within the context of the banking industry. This was done by drawing information from the literature review of the subject and empirical data gathered from a questionnaire survey. The contradiction of results for some previous studies increases the significance of the present research, particularly in the demographic and situational characteristics area. The significance of the research findings of this thesis lies in the benefit of the results to both researchers and practitioners in this field. The identification of the factors affecting BIS success will ensure that future research in this area will be able to use this as a stepping stone, as well as assisting banks in their IS plans.

1.6.2 Practical or industry perspective

This is the first empirical study to investigate a proposed model in testing the success of ISs in the banking industry in Egypt.

This study will provide guidelines for bank managers and practitioners in designing, adopting and implementing ISs. It will also provide guidance in diagnosing the problems of the ongoing and current ISs and proposing solutions to improve their effectiveness. The current study will conduct an empirical investigation of the factors affecting the success of BISs from the perspectives of the individual users in the Egyptian banking industry.

1.7 Research scope

Since the financial service industry and the banking industry have been recognised as an information- intensive sector in the front position of IT applications (Clemons & Weber, 1990; Tigre & Dedrick, 2004), all the participants in the sample belong to the banking

industry. The major limitation of this study is that the setting of this study was restricted to the Egyptian banking industry. Thus, it was restricted within the national boundary of the study setting. Generalisation of the findings beyond an Egyptian context could be made, but with caution, due to various differences between this part of the world and others. However, the findings may apply to other countries, especially neighbouring Arab countries, as they display similar social and cultural values.

The scope of this study is also guided by the decision to select a suitable number of key potential demographic and situational variables, in addition to the adoption of DeLone and McLean's (2003) updated model, to be included in the proposed model. However, a longitudinal study is beyond the scope of this study, since it requires a fixed sample of elements to be repeatedly investigated and measured during a period of time (Churchill, 1999). A cross-sectional study, on the other hand, was applied in this research, which uses measurements on a single population and looks at distributions of variables within that sample and then infers cause and effect from associations between variables the researcher decides to designate as predictor and outcome (Churchill, 1999). In this study, the predictor variables were grouped into six main factors, based on the previous literature: system quality, information quality, service quality, demographic / situational variables, system usage and user satisfaction and each of these has its own factors. The predicted variables, on the other hand, consist of the impact on job performance (individual impact).

1.8 Thesis structure

The reminder of this thesis is structured as follows. Chapters 2 and 3 will provide a review of both the industry and academic literature. Chapter 2 is dedicated to an in-depth review of the banking industry in general and in Egypt in particular. Chapter 3 introduces and synthesises the foundational material required to develop and support the research model presented. A literature review of the original and updated DeLone and McLean IS

success models and proposed demographic and situational variables is presented. Chapter 3 concludes with the presentation of the proposed research model.

Chapter 4 presents the development of the research model by using telephone interviews and details of the components of the research design and data collection methodologies. The specific components of the design in Chapter 4 include the research design and methodology adopted in this study, including an explanation of the overall motivation and logic supporting the design. It also explains in detail the pilot and main data collection phases, the operationalisation of the variables, the sampling techniques and the statistical techniques.

Chapter 5 presents the data analysis of responses collected during the main phase of the study by the survey questionnaires. It begins with a set of descriptive statistics. This is followed by a revision of the research model based on some statistical analysis which divides the research model into three conceptual models. Then, the research models are evaluated by using Structural Equation Modelling (SEM) technique. Partial Least Square (PLS) is used to test the three conceptual models. The use of SEM and PLS is justified. Next, the measurement models are presented. The Chapter concludes with the presentation of the structural models.

Chapter 6 begins with a discussion of the study findings and presents the recommended three research models. Chapter 7 presents the academic, methodological and practical implications of the study. This is followed by a discussion of the study limitations and concludes with thoughts on future research required.

Chapter 2

Review of banking industry profile

2.1 Introduction

Banks spend heavy investments on information technology (IT) and US banks spent approximately \$31 billion in 2002. IT investments are becoming increasingly important to the banks' survival and growth (Bharadwaj, 2000). Therefore, such huge spending suggests that successful integration of IT is critical for the banks' survival in the increasingly competitive market.

Despite this importance, in 1990s, the literature revealed that only a few studies have been done on IT adoption in the banking industry (Morone & Berg, 1993). Nevertheless, Morone and Berg who conducted a study on IT innovations and ISs development in the US banks; concluded that much more is to be learned about these areas in banks and other financial institutions.

It must be noted that studies on banks' adoption and success of IT/IS within the context of developing countries, such as Egypt, are even scarcer. Almost all studies on the adoption and application of IT and ISs in the banks were conducted in developed countries, such as Europe, Australia and the USA (e.g. Gupta & Collins, 1997; Pikkarainen et al., 2004; 2006).

This issue should be a concern since Egypt and other Arab nation are also heavy spenders on IT/IS in the banking sectors (Abu-Musa, 2003). However, because of the lack of empirical research in the areas of IT/ISs in banks in Egypt, the need for this research has emerged to investigate the factors which may have an effect on the success of banking ISs to be able to justify the expenditures on them. In addition, Kamel & Hassan (2003) indicated that in the Egyptian banking industry, the decision of identifying the amount of money to spend on IT in general and on ISs in particular are in the hands of the banks' top management, regardless of opinions of bank managers and employees who are the actual

and sometimes heavy users of these systems. Therefore, an empirical study to investigate the success of these systems from the managers' point of view may shed light on the factors which may have an effect on IS success.

Thus, this chapter discusses in the first section the banking industry in general and some of the changes in this sector; the second section discusses the banking industry in Egypt and the role of IT in it.

2.2 Banking industry

Financial institutions are one of the largest investors in IT and ISs and the industry's IT spending reached unprecedented heights in the late 1990s (Gupta & Collins, 1997). It has been noticed that the banking industry has been a major player in the expansion into global markets. In the 1990s, bank spending on IT rose rapidly from some \$14bn in 1990 to \$20bn in 1995 (Teixeira, 1995). In 1994 alone, banks invested close to \$20bn in ISs and technologies in an effort to improve efficiency and enhance customer service (Gupta & Collins, 1997).

Many successful financial institutions have clearly demonstrated that ISs and technologies can be a powerful competitive weapon which can be used to capture market share, improve customer service, reduce operating costs and create new products and services (Leaderer & Mendelow, 1988). Chief Executive Officers (CEOs) and top managers often have an intuitive understanding of the power and potential of ISs, thus encouraging many companies and institutions to invest large sums of money in IS and IT (Gupta & Collins, 1997).

This rapid proliferation of IT/IS in the banking industry has redefined the primary function of banks from one of transaction processing to that of information processing (Teixeira, 1995). This diffusion of IT/IS has begun to derive benefits in terms of employee productivity (Strachman, 1994), increases in transaction throughput (Karr, 1996) and overall profitability (Teixeira, 1995). A survey in the USA indicated that

banks are increasingly deploying microcomputers to their employees to improve productivity and enhance customer service (Igarria et al., 2000).

Moreover, the use of and investment in, ISs by banking organisations will continue to increase for two reasons. Firstly, today, almost everyone is using some kind of IS in their day-to-day activities. Banking organisations cannot afford to be left behind technologically, since many customers are using these systems to manage their money, accounts and savings information and because these ISs are particularly appropriate as banking organisations are, by their nature, information intensive. Secondly, almost every effort to enhance the effectiveness and efficiency of banking organisations mandates the use of ISs to improve service delivery and reduce costs.

However, there is a growing debate in the business community about the importance of measuring the return on investments (ROI) in IS/IT. This is a difficult and challenging task, given that many of the benefits derived from IS/IT are both intangible and long term. Therefore, it is not always easy to assess the returns from these investments because of the many intangible benefits associated with IS and IT. The primary question of "What is the relationship between investments in ISs and the return on these investments?" is a difficult one to address since traditional ROI measures are often inappropriate and misleading for IT investments (Bender, 1988). As the IS community tries to develop innovative and meaningful cost-benefit methodologies for IS and IT and as the pressure on CEOs and chief information officers (CIOs) to be more accountable increases, more and more companies are taking a hard look at the gains derived from ISs (Benjamin, 1982).

In spite of the large investments in IS and IT by the banking industry and the pressing concern to assess the returns from these investments, one would expect there to be an extensive body of literature concerning research into the use of ISs in the banking sector. However, little has been done to assess the contribution of IS to the growth, profitability

and efficiency of banks. Most of the studies which investigated issues of IS success were in the context of education, health organisations, retail and wholesale organisations...etc, but there is a scarcity of empirical studies in the banking sector.

For example, Gupta and Collins (1997), in their empirical study, asked the respondents to identify some of the popular measures used in their banks to measure ROI in ISs. The study found that the two most popular measures were reduction in operating expenses and increasing in profitability. However, some studies indicated that both the above measures were poor and inadequate to measure the true value and contribution of ISs. There are several reasons why traditional measures of ROI fail when it comes to ISs. First, some of the significant benefits derived from ISs, such as added competitive edge in the marketplace and increased customer satisfaction, are difficult to measure. Second, the true impact of some systems can be assessed only over the long term. The tendency to use measures that are convenient, rather than appropriate places the organisation at the risk of poor investments or no investments in ISs (Gupta & Collins, 1997).

A literature search yielded few theoretical frameworks or financial models for such a study. Most references in the literature to BISs appear in trade journals and are often news releases of investments in specific technologies. There are a number of “how to” articles in the popular literature, such as how to design and develop client-server systems for banks, but little has been written on how to assess the contribution of such systems to the broader goals and objectives of the bank (Gupta & Collins, 1997). Thus the issue of measuring the impact of ISs on a bank's efficiency is both appropriate and timely.

On the other hand, some studies have shown that many ISs in less developed countries are, perhaps not surprisingly, under-utilised and hence do not make a significant contribution to improving the performance of organisations using them (e.g. Foster & Cornford, 1992; Odedra et al., 1993). This is further emphasised by Watson et al. (1997) who indicated that the second most important international issue in IS management is

effective usage of data resources. Hence, assessing the success of ISs within organisations has been identified as one of the most critical issues of IS management in most of the organisations and it is of vital importance for organisations to understand the factors that may affect their ISs success so as to be able to modify it to ensure better positive impacts on the individual, organisation, industry, society and economy levels.

Moreover, most if not all of the empirical evidence on IS success and its associated factors is confined to the use of data from developed nations, in particular from the USA. The findings of such research cannot necessarily be generalised to other environments where the social, economic and cultural characteristics are different. Such evidence needs to be validated by using cross-cultural research before it can be used to manage global ISs effectively (Elnady & Elkordy, 1996).

2.3 Change in banking sector

The banking sector occupies an important position in the global economy. Since the 1980s, the sector has been subject to many external and internal forces in many countries, (Gentle, 1993; Nellis, 1998; Rajan, 1998). Of the external forces, technological change is likely to have the most important impact on the sector. Technology is a significant driver of internal changes. Within the banking sector, external forces have attracted new entrants and increased customer influence. Internal change has been greatly affected by the Internet which caused major delivery changes. The cooperation of these forces brought a major transformation of the banking sector.

External forces have been categorised under political, economic, social and technological changes. They were likely to have the greatest impact on the sector in the wider business environment. The developments of these forces were beyond the control of the businesses themselves, but success or failure depended on how well management was able to predict and react to these changes.

2.3.1 External forces

Developments in technology dominated the revolution in the banking sector during the 1990s (Gandy, 1998). The world-wide expansion in technologies for connection supported increased globalisation of capital flows and financial organisations. Technology also facilitated the expansion of new products and services supporting new demands of customers. Competitive pressures were intensified as banks and financial organisations sought greater productivity and efficiency improvements to sustain profitability.

Changes in demographic and social trends, to a large extent, had driven the regulatory and economic shifts that happened in the 1990s (Llewellyn, 1996). In this context, the banking sector lay at the forefront of change in terms of society's needs. Technological change had the greatest impact on the banking sector over the 2000s (Bednar et al., 1995). Technology was frequently touted as a, if not the, key element in the formulae for productivity and profitability in the 1990s and beyond. It was likely to be the key factor driving change within the banking sector for the foreseeable future.

2.3.2 Internal forces

The slogan that the customer is king has never been truer for the banking sector than it is today. Legislation has increased customers' rights; technology and competition have increased their choice of products and providers. The Internet brought changes to the working environment, living conditions and types of banking use (Hagel et al., 1997). These changes put customers under a different set of conditions, resulting in changes in their behaviours. An increase in bank customers with more sophisticated needs was a consequence. Customers became more discerning as information became more accessible over the Internet. Switching between financial institutions and products continued to grow. For instance, Internet-enabled consumers were able to change banks at the press of a button, in the comfort of their homes. They had access to on-line "intelligent agents"

that gave them the ability to compare financial products and services for the best terms and conditions (Rogerson et al., 1999).

Within the supply chain of the industry, financial institutions were challenged to achieve a balance between staffing levels and skills, investment in technology and branch networks (Gentle, 1993). As financial organisations sought new sources of revenues and profits outside traditional banking disciplines, they demanded different skills and aptitudes from their staff. This demand, in addition to cost cutting and the impact of new technology, had already led to a significant decrease in overall staffing levels within the banking industry (Gentle, 1993).

As a result of the developments discussed above, the attractiveness of this sector to a wide range of potential new entrants had increased. The cost of entry to the banking sector declined, returns seemed very promising and the risk seemed manageable. As a result, there had been a flurry of new entrants (Gandy, 1998; Mols, 1998). Non-bank entrants exploited the unique capabilities of electronic networks and leveraged their own resources through Web-based strategies. New technologies, like smart cards and software cryptography, also decreased entry barriers to the banking business, and enabled non-banking competitors to take away more and more of the profitable elements of the banking business (Hagel et al., 1997).

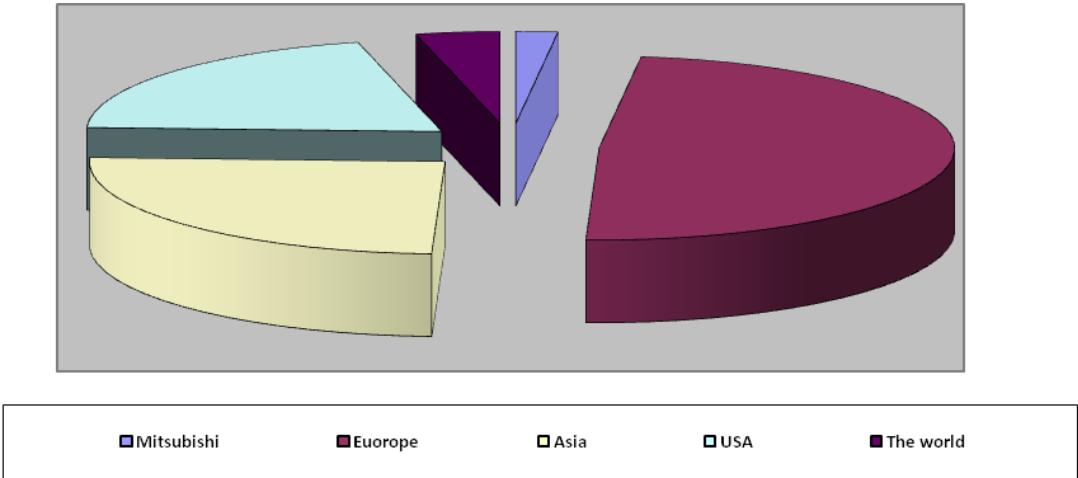
2.4 Global banking industry

The profile of the banking industry combines diversified and regional banks. The global banking industry generated total revenues of \$34.9 billion in 2006, representing a compound annual growth rate (CAGR) of 5.3% for the five-year period 2002-2006 (Data monitor, 2007).

The industry remains fragmented. Mitsubishi UJF Financial Group has deposits of over \$1.1 trillion, corresponding to 1.9 % of the global total.

The European region accounts for 48.7 % of the global industry’s value in 2006. This compared to Asia-Pacific which accounts for 25.1% and the US with 20.5% of the industry’s value. The rest of the world makes up the remainder of the industry, with 3.8% of the industry’s value in 2006. Figure 2.1 shows the fragmentation of banking industry value.

Figure 2.1 Fragmentation of banking industry value



The performance of the banking industry was forecast to decelerate, with an anticipated CAGR of 4.8% for the five-year period 2006-2011 expected to drive the industry to a value of \$44.1 billion by the end of 2011 (Data monitor, 2007).

As the global economy grows, banks will benefit both from additional deposits which can fund their investments, and additional fee and interest revenues as customers demand loans and other services in order to grow their own businesses (CBE, 2008).

The four leading banks (Mitsubishi UFJ Financial Group, HSBC Holdings plc, Bank of America and Citigroup) hold 9.4% of global deposits. The largest players may find their growth in any particular country limited by legislation capping the total amount of deposits a single institution can hold there (Data monitor, 2007). The following Table 2.1 shows global banks’ market share, by value in 2007.

Table 2.1 Global banks' market share, by value 2007 (Data monitor, 2007)

% Share	Company
3.2 %	Mitsubishi UFJ Financial Group
2.5 %	HSBC Holdings plc
1.9 %	Bank of America
1.8 %	Citigroup
90.6 %	Others
100.0%	Total

2.5 Economic profile in Egypt

On the economic front, Egypt's real gross domestic product (GDP) has been growing at a consistent average rate for over a decade, averaging 4.6% during the period 1990-2006 and the medium-term forecast for the compound annual growth rate for Egypt during the period 2006–10 stands at 4.4%. However, the economic growth rate is unable to generate enough jobs to curb the high unemployment rate in Egypt, which in 2006 stood at over 12%. The authorities were trying to address the problem by attracting more foreign investors through its privatisation programme and economic liberalisation. These investments would primarily be in the banking, finance and tourism sectors which hold significant growth potential for the economy (CBE, 2008).

There were certain impediments which would curb the economy from moving into a sustainable growth path. Foremost among them are high unemployment rates, sub-standard levels of education, poor healthcare system and gender bias, especially in the job market, regional inequalities and excessive government controls in certain heavy industries (CBE, 2008). However, appropriate macroeconomic reforms coupled with growth in business opportunities in the telecom, petroleum, banking & finance and tourism sectors have raised investor confidence in Egypt. The following Table 2.2 shows some of the key facts about Egypt.

Table 2.2 Egypt's Key facts (CBE, 2008)

Full name	Arab Republic of Egypt
Capital city	Cairo
Government type	Republic
Head of State	President Hosni Mubarak
Head of Government	Prime Minister Ahmed Nazif
Population	80.3 million
Total area	1,001,450 sq km
Geographical location	Northern Africa, bordering Mediterranean Sea, between Libya and Gaza Strip, and Red Sea north of Sudan, and include Asian Sinai Peninsula
Language	Arabic (official), English and French
Ethnic Composition	Egyptian 98%, Berber, Nubian, Bedouin, and Beja 1%, Greek, Armenian, other European (primarily Italian and French) 1%
Major religions	Muslim (mostly Sunni) 90%, Coptic 9%, other Christian 1%
Life expectancy	71.6 years (total population), 69.0 years (men), 74.2 years (women)
Currency	Egyptian pound
Main exports	Crude oil and petroleum products, cotton, textiles, metal products and chemicals
GDP per capita	\$ 1626

2.5.1 Economic environment

The economy of Egypt is presently in a transition phase; it was previously highly centralised before becoming a market-administered economy. However, the growth has remained at slightly similar levels in the last five years (2002 – 2006). Although President Mubarak's government has emphasised the need for privatisation and liberalisation of the economy, social policies such as subsidies on food, energy and other essential commodities have kept the budget deficit at high levels. But, the deficit for the financial year 2005–06 decreased to 8.6% from its previous level of 9.6%, although it mainly involved gains from the short-run privatisation process rather than any fiscal improvement (Data monitor, 2007).

Despite a consistent slightly growth in the economy there was a steady rise in the number of people unemployed in Egypt. As of 2006, the total number was 3.1 million, and this rate is growing at an average rate of about 8% of the labour force (Data monitor, 2007).

High unemployment levels coupled with low public sector wages along with a rise in inflation have put considerable pressure on the poor.

According to the Doing Business Survey of 2006, by the World Bank, Egypt is better-off than other countries in the region in facilitating business. However, when compared to OECD countries, it has yet to make a significant impact.

The introduction of a unified tax rate of 20% in 2005 on all corporate and personal incomes has drastically reduced the tax burden by about 50%. These reforms have augured well for the country's business community. In spite of these reforms, several structural problems remained. Corruption is also high in Egypt with a rank of 70 among 163 countries (Data monitor, 2007).

2.5.2 Economic performance

Egypt's economy has been witnessing steady growth since the early 1990s as a result of a series of macroeconomic reforms and assistance from the International Monetary Fund (IMF); however, the CAGR remained the same during the last five-year period (2002 - 2006) (Data monitor, 2007). Egypt's economic performance continued its improvement in July-December 2007/2008. Real GDP growth rate posted 6.6 % during the first half of 2006/2007 (January- June) and 6.8 % during the second half (July-December). The key engines were the manufacturing sector (18.9 %); agricultural, irrigation, and fishing (16.1 %); retail and wholesale trade (12.4 %); general government (9.2 %); extractions (8.3 %) (CBE Economic Review 2007/2008).

The Egyptian economy is continuing to attract new investments lured by the privatisation and reform programmes of the government. In 2006, the economy grew at 4.4% mainly

due to the continuing privatisation programme and reforms, especially in the finance and trade sectors. The amount of net foreign direct investment (FDI) inflows reached \$5.4 billion in 2005, up from just \$510 million in 2001. The authorities in Egypt had anticipation of a further rise in FDI of about 20% in 2006. Though inflation rose to 5.6% in 2006, up from 4.9% observed during the previous year, it remained relatively under control as compared to the 16% and above rates recorded in 2004 (Data monitor, 2007).

The services sector in Egypt is the largest and accounts for almost 50% of GDP and employs over 50% of the labour force. The major contributors to the services sector are the banking and finance and tourism sectors. Liberalisation reforms in the 1990s saw the banking sector evolve into one comparable to international standards. In recent years, the financial sector has also undergone major restructuring with the consolidation of many small banks. In 2006 alone, the consolidation drive saw the total number of banks fall from 65 in 2005 to 40. This restructuring is likely to continue and the authorities expect the total number of banks to rise to almost 41 in 2008. The tourism sector in Egypt is the largest in Africa, and Egypt attracted almost 9 million foreign visitors in 2006, a rise of about 5.5% from 8.7 million in 2005 (Data monitor, 2007).

One of the major sources of revenue for Egypt is the Suez Canal link which is used as an international merchant trade route. The canal helps to cut the voyage of ships by almost 40%, thereby saving cost and duration of transport between East Asia and Europe. The canal is Egypt's major revenue earner with contributions to the tune of \$5.5 million every day. On an average, 8% of the world's shipping traffic passes through this route (Data monitor, 2007). The following Table 2.3 shows the real GDP from 1990 to 2006.

Table 2.3 Real GDP (US \$ billions) 1990-2006 (Data monitor, 2007)

Year	Real GDP \$ billions	% Growth
1990	62.5	
1991	65.3	4.5
1992	68.6	5.1
1993	71.3	3.9
1994	74.6	4.6
1995	78.4	5.0
1996	82.7	5.5
1997	68.0	4.0
1998	91.3	6.1
1999	96.2	5.4
2000	99.6	3.5
2001	102.8	3.2
2002	107.0	4.1
2003	111.4	4.1
2004	117.0	5.0
2005	122.8	5.0
2006	128.2	4.4

Egypt is self-sufficient in meeting its food requirements and the agricultural sector is a major export revenue generator for the economy. The sector employs 30% of the labour force and in 2006 contributed around 14.8% of GDP and accounted for 30% of Egypt's commodity exports. Rice has remained the largest export crop since 2001 and in 2005 export values had more than doubled to \$293 million from about \$134 million in 2001. Other major agricultural commodities are cotton, potatoes and oranges. Agricultural activity in Egypt is possible only along the Nile river stretch as most other parts are barren. As of 2006, only 3.5% of Egypt's land area can be cultivated. The following Table 2.4 shows the real GDP 2002-2006 and the CAGR 2006 - 2010 forecast comparison between Egypt and some Arab countries.

Table 2.4 Real GDP CAGR 2002-2006 and forecast CAGR 2006-2010 comparison

(Data monitor, 2007)

Countries	GDP 2002-2006	CAGR 2006-2010
Egypt	4.6	4.4
Saudi Arabia	5.7	4.1
United Arab Emirates	7.9	7.1
Qatar	7.8	8.1
Jordan	5.4	4.8

The industrial sector in Egypt contributes a significant 35.5% of Egypt's GDP. In 2005, the foodstuff, beverage and tobacco segment contributed almost 33% of the total value of industrial production. This was followed by the chemical industry which accounted for 15% and textile, clothing and leather segments which added another 10%. The petroleum sector in Egypt is also huge and the authorities pin their hopes on it to help Egypt achieve self-sufficiency in meeting fuel requirements. The industry provides employment to almost 17% of the total Egyptian labour force. Most of the heavy industries in Egypt fall under the direct purview of the government as they are in the public sector category.

The high growth in the CAGR in Egypt has raised the expectations of the FDI coming into Egypt in 2006 as the authorities have maintained good trade relations with the European Union (EU), which is its largest trade partner, while simultaneously prioritising the need to strengthen ties with the other emerging Asian economies.

The rising share of emerging economies in global trade would help Egypt in enhancing its trade prospects. Although Egypt has been incurring trade deficits, its imports largely comprise investment capital made up of machineries and equipment, which constitute 26% of its total imports. The imports of these capital goods will help Egypt to produce more in the future while reducing the cost of production.

As for banks, many smaller banks in Egypt have been merged to form larger entities, which enhance their financial capability. More of such consolidation is planned for the financial year 2007-2008 by the authorities in order to further strengthen Egypt's financial sector, which is crucial for economic development. Despite apprehensions about terrorism, especially after the backlash against Islamic countries post-September 11 terrorist attacks in 2001, the tourism sector is growing fast as a major source of revenue and in 2006 tourist arrivals in Egypt witnessed a 5.5% increase. The following Table 2.5 shows the real GDP forecast 2006-2010.

Table 2.5 Real GDP forecast (US \$ billions) 2006-2010 (Data monitor, 2007)

Year	Real GDP (US \$ billions)	% Growth
2006	128.2	
2007	133.9	4.4
2008	139.8	4.4
2009	145.9	4.4
2010	15203	4.4

2.6 Banking industry in Egypt profile

Like other economic sectors, banking fell under government control and banks were nationalised and amalgamated in 1963 into four big commercial banks: National Bank of Egypt, Bank of Alexandria, Bank Misr and Bank of Cairo. They were owned and regulated by the Central Bank of Egypt (CBE). Numerous special-purpose banks were also created, including those for industrial and agricultural credit, mortgages and social security funds.

The most important change in the banking structure was the emergence of three types of establishments: private, joint venture and, after 1984, Islamic investment companies (CBE, 2008).

Nevertheless, the big six public banks, partly because they had branches throughout the country, continued to handle about 60% to 70% of total assets. Because of acquisitions, mergers and privatisation, the banking sector as a whole now has 6 public banks, 28 joint and investment banks and 7 branches of foreign banks listed in three groups. Table 2.6 shows the three groups of Egyptian banks (CBE, 2008).

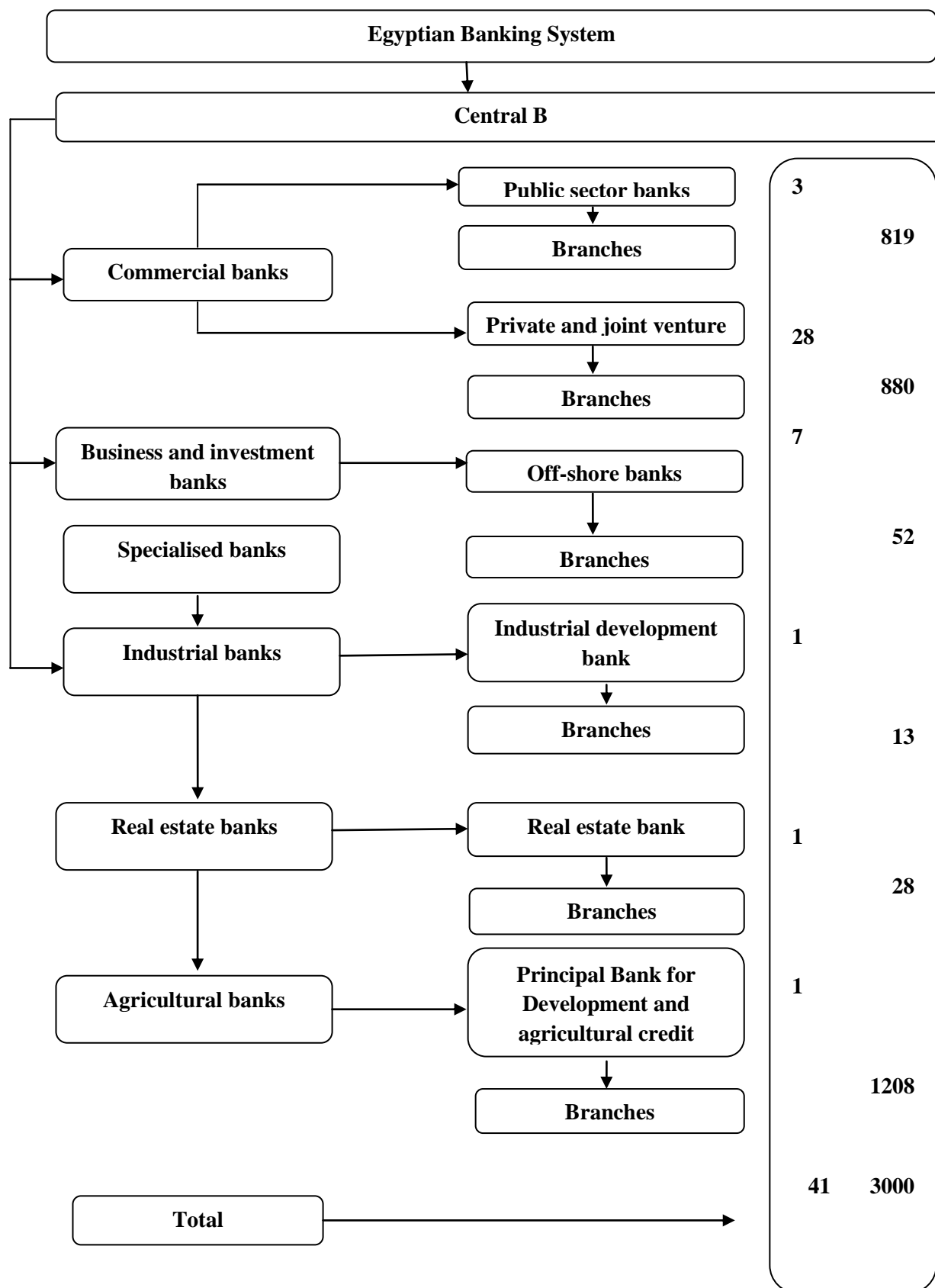
Table 2.6 Groups of Egyptian banks

Public sector banks	<ol style="list-style-type: none"> 1. Bank Misr 2. Cairo Bank 3. National Bank of Egypt 4. Egyptian Arab Land Bank 5. Industrial Development Bank of Egypt 6. The Principal Bank for Development and Agricultural Credit
Private and joint venture banks	<ol style="list-style-type: none"> 1. Bank of Alexandria 2. Commercial International Bank (Egypt) S.A.E. 3. Blom Bank- Egypt 4. BNP Paribas S.A.E. 5. Suez Canal Bank 6. Piraeus Bank-Egypt 7. Ahli United Bank- Egypt 8. Audi Bank S.A.E. 9. Faisal Islamic Bank of Egypt 10. Egyptian Saudi Finance Bank 11. Al Watany Bank of Egypt 12. National Bank for Development 13. Alexandria Commercial and Maritime Bank 14. Societe Bank of Port Said 15. Egyptian Gulf Bank 16. HSBC Bank Egypt S.A.E. 17. Egyptian Workers Bank 18. The United Bank 19. Misr Iran Development Bank 20. Barclays Bank Egypt S.A.E. 21. Societe Arab International Bank 22. Credit Agricole Egypt S.A.E. 23. National Societe General Bank 24. Federal Arab Bank for Investment and Development 25. Housing and Development Bank 26. Arab African International Bank 27. Arab Banking Corporation-Egypt S.A.E. 28. Export Development Bank of Egypt
Branches of foreign banks	<ol style="list-style-type: none"> 1. National Bank of Abu Dhabi 2. Citi Bank N A / Egypt 3. Arab Bank PLC

	4. The Bank of Nova Scotia 5. Mashreq Bank 6. National Bank of Greece 7. National Bank of Oman S.A.O.G.
--	--

Each of the above banks has several branches all over Egypt. Although private and joint venture banks are growing, many remain relatively small, with few branch networks. Egypt's banking system has undergone major reforms since the 1990s and today it is faced with a liberalised and modernised system which is supervised and regulated according to internationally accepted standards. The following Figure 2.2 shows the structure of the Egyptian banking system. It is noticed that Egyptian banks abroad are not included nor are two banks established under private laws and registered with CBE: The Arab International Bank and Nasser Social Bank. There are 41 banks and 3000 branches (CBE, 2008).

Figure 2.2 Structure of Egyptian banking system (CBE, 2008)



The Central Bank of Egypt (CBE) has improved some aspects of the Egyptian banking systems in the following ways:

- Introduction of laws giving more independence to the CBE such as the electronic signature law
- Regulation of connected and related party lending
- Management reforms of the six public sector banks, making clear the responsibilities of managers and boards of directors
- Development of an automated credit risk information system (CRIS) from which participants would be able to gain online access to customers' credit profiles.

During the first half of 2007/2008, the CBE continued to strive to achieve the overriding objective of its monetary policy, e.g. price stability by steering short-term interest rates. Consequently, the following sections present some of the related issues of the Egyptian banking industry.

2.6.1 Factors affecting Egyptian banking industry

Since the mid- 1990s, the banking sector in Egypt has been changing fast. The number of individual bank customers reached 12 million (Kamel and Hassan, 2003) and a variety of retail products are currently offered by a large number of banks. Moreover, banks are competing in expanding their branch networks and diversifying their delivery channels, services, products...etc. The following section discusses briefly the factors which may have an effect on the Egyptian banking sector (Kamel & Hassan, 2003):

- **Political factors**

The political system in Egypt played a significant role in the growth and expansion of local and international banks and a major role in attracting banks and financial institutions all over the world to establish joint ventures or representative offices in Egypt. The banking sector was entirely public from the 1950s, when it was nationalised. However, in

the 1970s, the government allowed the establishment of private banks. In 2002, the number of international players in the banking market increased. In addition, to help growth of the banking sector, a number of laws and regulations were established, including an electronic law which is expected to have a positive effect on the growth of the credit card market of different banks (Kamel & Hassan, 2003). Moreover, the expected approval of the new law on mortgages presents another opportunity for the banks to expand their retail activities in the area of housing loans (Kamel & Hassan, 2003).

- **Economic factors**

From the mid-1980s, an economic reform programme was followed in Egypt. This was designed to establish a stable economy. Macroeconomic indicators looked positive, with a growth rate at 6.6%, inflation rate at 6.8 % (CBE, 2008). Egypt`s success on its macroeconomic agenda secured the stability necessary for establishing investor confidence and stimulating the capital market (CBE, 2008).

- **Social factors**

The Egyptian population of more than 80.3 million in December 2008 (CBE, 2008) represents many attractions for local and foreign banks to expand their business. The current individual bank customers represent around 15% of the population. Among those customers, the number of credit card holders is less than 7%, which reflects the great potential of plastic money in Egypt (Hussein, 2001). According to age, bank customers can be divided into three categories (Kamel & Hassan, 2003):

1. Youth (20-30) represents the most important target group, with their accounts and student loans. They easily adopt technology but their loyalty to the bank is not guaranteed which requires continuous innovative financial services and incentives to attract and keep them.

2. The second group (30-50) represents good potential with a large number of housewives within this segment who are willing to use different electronic delivery channels such as automated teller machines (ATM).
3. The last group (above 50) represents some reluctance in dealing with banks in general and in using technology-based financial services in particular, which means that this group requires special care and lots of incentives such as retirement packages and special senior bank accounts.

Additionally, for a long time, the Egyptian banking market was dominated by cash-society values. However, recently, private banks began to offer their employees various payroll plans provided by different banks. This resulted in an increase in the number of individual bank customers who started to recognise the benefits of retail banking. Consequently, ease of use, simplicity and Arabic interfaces are some key factors for the adoption of new services provided by banks, not only on the customers' level but on the bank managers' and employees' levels as well.

- **Technological factors**

The rate of IT/IS adoption and usage in the banking sector increased over the last decade as a result of the growth in the banking activities. From the mid-1980s, Egypt focused on building its IT infrastructure. The huge improvements in telecommunications' infrastructure cost, its reliability, accessibility and bandwidth are providing a strong motive for substantial technology investments in the banking sector in Egypt (Magued, 2001). However, despite the increasing technology investments made by banks, the sector is still considered in the early development stages in terms of banking technology infrastructure necessary for future large-scale ISs' adoption and implementation (Kamel & Hassan, 2003). To conclude, the banking industry is strongly affected by political, economic, social and technological factors. The current environment of the banking sector includes many opportunities and many risks as well. Although the potentials are high, the

challenges are much higher. Therefore, in order to succeed in the market and achieve a high level of bank managers' and employees' performance, banks operating in Egypt need to work on increasing employees' awareness and to carefully study and understand the employees' social and economic needs. Such objectives can be achieved through better understanding of the factors affecting the adoption and use of the IT/ISs within the bank such as BIS and using these factors as indicators for better IS design and implementation.

To summarise, the service sector in Egypt is the largest accounting for almost 50% of GDP and employing over 50% of the labour force and the banking sector in Egypt is considered one of the most important and fastest growing sectors in the Egyptian economy. In recent years, Egyptian banks have been making many changes in order to improve the overall quality of their services. Advances in the IT/ISs in the Egyptian banking industry as well as investments in IT/ISs in this sector have been adopted by bank managers. However, although assessing the ROI in IT/ISs is very important to the financial organisations, little has been done to assess the returns from these investments in the performance of bank individuals or of the bank itself. For this reason, the current study chose the banking sector as an appropriate context in which to investigate the success of BISs.

2.7 Role of IT in Egyptian banking industry

The forces of globalisation and privatisation are sweeping the global regional and country economies including those of the Middle East. It is significant that all countries adopt the new information and communication technologies (ICT) in order to integrate properly into the global economy. The role played by IT is unique and it is widely recognised that the degree of IT development in different regions and countries of the world would greatly impact on their respective socio-economic development (Ali, 2004).

The Middle East as a region lies far behind other regions of the world in IT development and adoption. Although the Middle Eastern countries are characterised as developing

countries, they lag behind the other developing regions of the world such as Asia and Latin America. Therefore, the Middle East region provides a research challenge for IT/IS researchers to investigate the various issues, challenges and opportunities for understanding the role of IT in this region's economy. Table 2.7 shows a comparison between different regions in the world in terms of the growth in Internet usage, population penetration and global Internet users (Ali, 2004).

Table 2.7 Regional comparison of Internet world usage (Ali, 2004)

World Region	Growth (2002-2003)	% Population Penetration	% Global Users
Africa	78.8	0.9	1.2
Asia	84.5	5.9	30.9
Europe	93.5	27.6	29.2
Middle East	128.0	4.6	1.8
North America	86.3	62.2	29.5
Latin America / Caribbean	96.3	6.6	5.2
Oceania	98.0	47.9	2.2

It is noted that the Internet usage penetration in the Middle East is the lowest in the world regions except for Africa, thereby accounting for only 1.8 % of the total world Internet users. However, at the same time, the Middle East region had the highest growth of Internet usage between 2002 and 2003; compared to other regions.

Thus, it is evident that while the current rate of Internet penetration is low, the potential rate is significantly higher than in many parts of the world. These statistics provide an indication of both opportunities and problems of IT development in the region. If the Middle East has to catch up with the rest of the world, IT development and implementation need to speed up in different sectors of the society (Ali, 2004). However, a key variable influencing IT spending in this region is economic diversification. Some economies in the Middle East, such as Kuwait's, remain highly dependent on oil. In the United Arab of Emirates (UAE), however, some 80% of GDP is accounted for by the non-oil sector and in Qatar around 38%. In Gulf countries, government's have used oil revenues to fund development of other sectors such as

manufacturing, and this should provide a source of opportunity for IT sector investors in the years ahead. The share of the non-oil sector in IT spending is expected to fall slightly in the UAE but to rise in Saudi Arabia, which accounts for 40% of regional IT spending. However there will continue to be significant spending on new technology driven solutions in the hydrocarbons sector (Egypt Information Technology Report, 2009).

Another factor in IT opportunities is the waves of e-government initiatives being implemented in states like Kuwait, the UAE and South Africa, among others. First-placed UAE has continued to roll out eservices in 2008, following the recently announced UAE Strategic Plan, which called for a strengthening of e-government programmes. The UAE's federal government is attempting to emulate the best practices of the local governments. In Saudi Arabia too, substantial budgets have been allocated for e-government infrastructure development (Egypt Information Technology Report, 2009).

Over the last two decades, Egypt is expected to be one of the fastest growing IT markets in the region over the next few years as household computer penetration rises, despite a number of constraints, including low disposable incomes and economic disparities. However, fulfilment of the market's undoubted potential will depend on a functioning government being able to take the steps necessary to enable this.

The banking industry has been highly affected by technology evolution. In Egypt, in conjunction with global trends, the banking business had been undergoing huge changes. As a result, the banking industry always faced a significant uncertainty regarding potential investments in advanced banking technologies. Regardless of the return, banks in Egypt were investing large amounts of money in technology, not only to maintain a competitive edge, but also to remain in the business. In order to make better forecasts for business

planning and decision-making, banks need to better understand the different factors influencing the success of ISs in those banks (Kamel & Assem, 2002).

The development of IT in the Egyptian banking industry (EBI) could be classified under three main stages. In the first stage (1955-1965) computers were believed to be suitable only for big banks. Therefore, great attention was directed to gradually computerise the manual and routine data transactions. In this stage, data were entered and processed in batches. In the second stage of development (1965-1975), computers were used to rationalise decision making in the EBI. Real-time transactions and on-line systems were used in a very limited way at this stage. In the third stage (1975- to date), computers are widespread in Egyptian banks. Most banks have managed to computerise their bank functions and services to satisfy their employees' and customers' needs and to face the great competition of foreign and international banks. Many banks coped with sophisticated technology by creating computer departments and implementing comprehensive ISs (Kamel & Hassan, 2003).

The success in the application of different ISs in the banking sector relies to a large extent on the ability of bank managers and employees to accept, adopt and use such systems. In Egypt, most of the technology-related decisions are based on reactions to other decisions taken by the competitors, without a real study of actual managers' and employees' needs and perceptions, which leads to the creation of a high level of risk associated with such a strategy. An overestimation of managers' and employees' acceptance of the IS can misguide decision-makers to get involved in investments which may not give return (Kamel & Hassan, 2003).

IT is an important part of the banking industry and banks have leveraged it to increase efficiency, reduce costs and, most important of all, provide innovative products and services to their customers.

In recent years, investment in IT by the banking industry has served to streamline operations, improve competitiveness and increase the variety and quality of services provided. Therefore, the EBI has introduced the following IT developments (CBE, 2008):

- Completing the CBE automated website. All information and data to be posted were collected from the banks' different departments.
- Completing the Human Resource Management System (HRMS) to raise the efficiency of bank staff and ensure the objective evaluation of their performance.
- Accomplishing the implementation of a system for collecting and settling finance cheques. Almost all of the state-owned banks have participated in this system and the Arab Egyptian Real Estate Bank is on the way. The aim of this system is to improve liquidity management through expediting the settlement of cheques where the duration of settlement is shortened from almost one month to two working days at most.
- Coordinating efforts with the Ministry of Finance for implementing a project regarding the settlement of government receipts. Receipt transactions are currently being automated to be settled with banks, for the account of the Ministry of Finance, within only two days instead of one month.
- Following up the final stages of the CBE new building. Many of the banks' departments have been already relocated to the new building without any disruption in their work (CBE, 2008). The following Table 2.8 shows an example of one of the IT developments in the EBI which is a list of the banks licensed to carry out e-banking (CBE, 2008).

Table 2.8 Egyptian banks licensed to carry out e-banking (CBE, 2008)

Bank	Date of licensing	Type of transaction
National Societe General Bank	13/11/2002	Phone Banking
	22/12/2003	Internet Banking
Egyptian Gulf Bank	22/12/2002	Internet Banking

Arab Bank PLC Egypt	22/12/2002	Mobile - Phone Banking , Internet Banking
Commercial International Bank	2/2/2003	Phone Banking, E-CIB
	22/12/2003	Internet Banking
Egyptian American Bank	26/2/2003	Phone Plus
	26/12/2004	Smart Card
	23/6/2005	Internet Banking
HSBC – Egypt	25/3/2003	Internet Banking, Phone Banking
<u>Citibank</u>	27/3/2003	Citi connect , Citi direct , Citibank On Line
<u>Faisal Islamic Bank of Egypt</u>	18/3/2004	Internet Banking
BNP Paribas S.A.E.	20/5/2004	Internet Banking
<u>Misr International Bank</u>	5/8/2004	Mobile Banking
<u>Principal Bank for Development and Agricultural Credit</u>	20/2/2007	Visa Prepaid Card (Sounbolah)
<u>Bank Audi</u>	4/4/2007	16555 Call Centre

IT has, in large measure, been the enabler which has facilitated permanent change in the banking industry. New products and services have emerged and they are being delivered through innovative channels, for example, online banking, online bill payments, integrated customer information systems, Automated Teller Machines (ATM), and electronic funds transfer at point of sale (EFTPOS). A few years ago these were considered novelty services but have now become a given. Technologies like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), E-commerce, wireless innovations and the Internet have given banks the tools to differentiate banking services from their competitors' offerings and reduce costs. These technologies have brought banking services into our living rooms, on the road and with the use of mobile

phones as a delivery channel have given the ability to conduct banking transactions at anytime, anywhere.

Economic theory supported by empirical evidence suggests that, in general, increases in technology investments will increase productivity, lower costs and allow firms to operate more efficiently. For banks, however, there is limited empirical evidence to support this theory because of the lack of reliable data and measurement problems and because of the time lag between technology adoption and ROI. However, if banking conforms to the pattern of other mature industries, the impact of IT/IS investment should be increased competition and overcapacity, leading eventually to consolidation.

2.8 Impact of IT on Egyptian banking system

The financial sector, with its various institutions and especially banks, has been heavily influenced by the emerging information revolution. In the previous section, we discussed the role of IT in EBI in general. However, this section discusses in particular the positive impacts or benefits of IT on various aspects of the EBI.

The ongoing implementation of Egypt's banking sector reform plan continues to provide opportunities for IT vendors. The Central Bank of Egypt's announcement that it was to modernise its IT infrastructure as a basis for a reform of work practices through the application of IT was one major driver. The banking sector in Egypt has traditionally suffered from low profitability and poor asset quality, creating a significant opportunity for the application of IT. However, more recently, Egypt has implemented banking reforms and applied the best-practice in a number of fields, including IT. While banks have often lagged behind government and telecommunications in embracing modern technology, the sector is currently in the midst of a five-year plan to boost liberalisation and privatisation, encouraging a wave of innovative IT projects.

According to the Central Bank of Egypt (CBE, 2008), the international bank industry has undergone a remarkable development, particularly in IT serving management as well as customers and it has also had a direct impact on bank performance as follows:

2.8.1 Impact of IT on bank management

According to the Central Bank of Egypt (CBE, 2008), examples of the impact of IT on bank management could be summarised in the following points:

- IT allows banks to determine the daily position of internal and external transactions throughout the bank network.
- IT facilitates various bank activities, such as electronic bills, collecting customers' debts and managing portfolios.
- IT is used in the bank security procedures and to secure bank transfers, securing entrances and providing codes to protect ISs.
- IT and microfilm systems are used for archival work to save effort and space.
- Remote communication technology facilitates the linkage of banks with international stock markets

2.8.2 Impact of IT on customer services

Again, according to the CBE (2008), some of the positive impacts of IT on bank customer services could be summarised as follows.

- Automated Teller Machines (ATM) facilitate the way for customers to use electronic credit cards and withdraw from their accounts at any time, regardless bank's working hours.
- ICT gives customers access to prompt information on their accounts and exchange rates and other indicators through online banking.
- IT provides customers with new services such as online bill payments, integrated customer ISs and electronic funds transfer at point of sale (EFTPOS).

2.8.3 Impact of IT on bank performance

Information and linkage technology played an important role in changing work patterns and management methods. They also had a positive impact on banks performance as follows:

- Conducting thousands of transactions regardless of size or place.
- Linking banks' branches all over the world and providing various financial services, raising operating efficiency and gaining competitive advantage.
- Guiding banks' senior management to make sound decisions with the help of daily, weekly and monthly positions of the bank.
- Globalising financial activities after eliminating local barriers.

However, Egyptian banks are still behind other Western banks in supplying for example a good range of mortgage products to their customers. Although this is soon to change, the mortgage market is underdeveloped in Egypt and, as yet, foreigners cannot obtain a mortgage. In the near future, a new mortgage law will enable purchasers to take out property loans and this will open up the market considerably and create a wave of development and real estate activity.

The next chapter discusses the first part of the literature review made for this study and presents a comprehensive overview of IS success and a background of the DeLone and McLean model. There follows an overview of the studies which have evaluated IS success, the studies on success of ISs in the banking industry and concludes with the studies which have attempted to develop comprehensive models for evaluating IS success.

2.9 Summary

IT is without doubt the life blood of any organisation. For the banking industry, IT has been the great business enabler which has facilitated dramatic change in the banking industry for ever. In spite of the large investments in IT and IS by the banking industry and the pressing concern to assess the returns from these investments, little however has

been done to assess the contribution of IS to the individual and organisational performance of banks. This chapter has presented a profile of the banking industry as a whole and changes in the banking industry and concluded with a profile of the banking industry in Egypt and the role of IT in the banking sector.

Chapter 3

Literature Review

3.1 Introduction

Measuring IS success has puzzled researchers since the introduction of computers into the business environment (Hoos, 1960). A great number of researchers have tried to solve this puzzle by looking at what effects ISs have on individual workers (Roach, 1987), management at different levels (Strassmann, 1997), and groups of different types and organisations with different sizes, types and objectives (Brynjolfsson & Yang, 1996; Strassmann, 1997). Also, different levels of study were used, e.g. by firm, industry, entire economy or national and international (Brynjolfsson & Yang, 1996; Strassmann, 1997).

IS managers in companies are under increasing pressure to justify the value and contribution of ISs to the profitability of the organisation (Noshei, 1984). Seddon et al. (1999) indicated that the total annual worldwide expenditure on IT exceeded one trillion US Dollars every year and was growing at about 10% annually. In addition, ISs are involved in almost all aspects of human life. Taking into consideration the high investments in IT, the success of such investments and the quality of IS developed is very important for both research and practice (Iivari, 2005). Therefore, developing and applying a systematic model for assessing ISs is a significant issue (Drucker, 1989). Such a model should be multidimensional as an organization needs a diversity of measures to assess its health and performance just as a human being has similar needs (Drucker, 1989).

Previous research had attempted to develop comprehensive models for IS success in which researchers have attempted to clearly identify IS success dimensions, the relationships between these dimensions and the relationships between these dimensions

and the other organisational variables (e.g. Al-Gahtani, 2004; Ballantine et al., 1996; Myers et al., 1997; Grover et al., 1996; Hirschheim & Smithson, 1998; Leonard & Riemenschneider, 2008; Glorfeld, 1994; Seddon, 1997; Ishman, 1998; Garrity & Sanders, 1998; Roca et al., 2006; Jennex et al., 1998; Lin, 2008; Masrek, 2007; Molla & Licker, 2001; Prybutok et al., 2008; Romi et al., 2008; Wang, 2008; Wu & Wang, 2006).

Nevertheless, it appeared that there is a need to develop a comprehensive model for assessing ISs in the banking industry. Therefore, this study seeks to advance the understanding of BIS success by proposing a theoretical model which can be used to investigate the success of BISs in terms of the applicability of the research model proposed from the bank managers' points of view.

Unfortunately, there have been few studies (empirical or conceptual) in the banking sector which could be used as a basis for building a comprehensive model for doing so. However, models developed to assess IS success in other industries can be used in the banking industry and established measures taken from existing literature can be used in operationalising the variables of the proposed theoretical model. Because IS success is a multi-dimensional concept which can be assessed at various levels, the measure for IS success has neither been totally clear nor exactly defined.

However, of the available concepts, DeLone and McLean (1992) made a major breakthrough when they conducted a comprehensive review of IS success literature and proposed a model of IS success. DeLone and McLean (1992/2003), in their study which gained wide prominence and triggered much debate, tried to formulate a global outcome measure of IS success. DeLone and McLean called for further development and validation of their model. This call motivated many researchers to test, expand and

modify it. In fact, most of the studies that attempted to develop a comprehensive model or partial model for IS success were based on their model.

Thus, DeLone and McLean's (2003) updated model was the most appropriate IS model for use as the basic building block for investigating the factors affecting banking IS success and for developing a comprehensive BIS success model.

This chapter begins with section 3.2 in which the different definitions of IT and IS are presented. Section 3.3 presents an overview of IS success in general and the DeLone and McLean model in particular. Section 3.4 discusses the studies which have evaluated IS success; section 3.5 discusses the studies on success of ISs in the banking industry. In the second part of this chapter, a discussion of the proposed theoretical research model, its dimensions, variables and relationships is presented. The chapter also presents the development of the proposed research model through the additional new variables which are added to that model.

3.2 Information systems /Information technology (IS/IT)

The terms ‘information systems’ (IS) and ‘information technology’ (IT) are used interchangeably in the literature (Al-Gahani, 1998) (see Tables 3.1, 3.2). One can find different definitions for both terms, some of them overlapping. IT can be defined in various ways. One of the most common definitions among economists is that of the US Bureau of Economic Analysis (BEA) category, which defines IT as ‘Office, Computing and Accounting Machinery (OCAM) which consists primarily of computers’. According to BEA, Information Processing Equipment (IPE) includes communication equipment, scientific and engineering instruments, photocopiers and related equipment, besides software and related services which are sometimes included in the IT capital (Brynjolfsson & Yang, 1996). The Institute for Development Policy and Management at the University of Manchester (IDPM, 2002) defined IT as computers and

telecommunications or electronic means by which to accept, store, process, output and transmit information. However, TechTarget (2002) defined IT as encompassing all forms of technology used to create, store, exchange and use information in its various forms.

Alter (1999,2000) defined IS as a system in which human participants perform business processes using information, hardware and software to capture, transmit, store, retrieve, manipulate and/or display information for internal or external customers. Thus, ISs include the human element which uses the information, hardware, software and all forms of technology to create, store and exchange information in its different ways.

Iivari (2005) defined IS as a computer-based system that provides its users with information on specified topics in a certain organisational context.

However, Gasser (1986) and Strassmann (1997) defined IS as consisting of hardware, software, communication software, data or information, people or participants, and procedures or work process.

Table 3.1 Definitions of IT

Source	Definitions of IT
US Bureau of Economic Analysis	Office, Computing and Accounting Machinery (OCAM) which consists primarily of computers
Institute for Development Policy and Management University of Manchester, 2002	Computers and telecommunications or electronic means by which to accept, store, process, output and transmit information
TechTarget, 2002	All forms of technology used to create, store, exchange, and use information in its various forms

Table 3.2 Definitions of IS

Source	Definitions of IS
Alter, 1999, 2000	A system in which human participants perform business processes using information, hardware, and software to capture, transit, store, retrieve, manipulate, and/or display information for internal or external customers
Iivari, 2005	Computer-based system that provides its users with information on specified topics in a certain organisational context
Gasser, 1986; Strassmann, 1997	Hardware, software, communication software, data or information, people or participants, and procedures or work process.

Because the terms IT and IS are sometimes used in an overlapping fashion in the literature (Al-Gahani, 1998), in this study the term IS was adopted to refer to IS-related issues and IS was defined as “Information systems provides its users with information on specified topics in a certain organisational context and consists of hardware, software, communication software, data or information, people or participants and procedures or work process”.

In this definition, hardware refers to the devices and other physical equipment involved in processing information, such as computers, workstations, physical networks and data storage and transmission devices. Software refers to the computer programs that interpret participants' inputs and control the hardware. Software includes operating systems and end user application software (Bonner, 1995; Alter, 1996; Kendall & Kendall, 1992; DeLone & McLean, 1992). Participants in an IS are the people who do the work; human participants in this system typically play essential roles such as entering, processing or using the information in the system.

On the other hand, the term ‘user’ refers to the internal or external customers who use the IS output (Alter, 1999). ‘Secondary customers’ are people who receive some benefits from the IS even if they do not use its output directly (Alter, 1999), so the term ‘users’ is wider than “participants”. In the IS literature, the term ‘user’ is used loosely to

mean both the participants and the internal and external customers. This might be because in many of the systems, employees play both roles. Nevertheless, both roles are not bound together and often participants and users are different.

However, in this study, the term ‘user’ refers to the internal employees who enter, process the information, and use the IS output within the organisation. The participants or users in this study includes branch managers, general managers, department managers and division managers of the banks who use all forms of IS output to help them in their work and in the decision making process.

3.3 Overview of IS success

IS success is one of the holy grails of IS research; it is the “*The principle criterion for evaluating information systems*” (Rai et al. 2002; p.50). However, there is no agreement among IS researchers regarding a specific definition of IS success as this concept is vague and multi-faceted (Foshay, 2008). IS success definition and measurement are still problematic for many reasons (Seddon et al., 1999). The first is the mixture of social and technical aspects of an IS (Kanellis et al., 1999). Secondly, Alter (2000) argued that IT and work practice are interrelated so that it is difficult to separate their specific contributions to IS success. Other researchers (e.g. Garrity & Sanders, 1998) refer to the methodological aspects involved in measuring IS success, which makes it difficult to define the success. Nevertheless, elements of ‘IS success’ were variously described as incorporating improved productivity (Bailey & Pearson, 1983), changes in organisational effectiveness, and utility in decision making (Ives et al., 1983).

In early studies, the term ‘IS effectiveness’ was considered to be the result of the comparison between IS performance to its predefined objectives (Hamilton & Chervany, 1981), while ‘IS success’ referred to the achievement of those objectives,

where the measurement was dependent on the technical level using technical attributes which focus on performance characteristics such as resource utilisation, hardware utilisation efficiency, reliability, response time, ease of terminal use (DeLone & McLean, 1992; Hamilton & Chervany, 1981; Kriebel & Raviv, 1980; Swanson, 1974).

So, we can say that IS effectiveness was more related to the performance of the IS department, whereas IS success was more related to the achievement of the organisation's predefined objectives, to the level and scope of the IS usage by the management, and finally, to the impact of IS on individual or organisational performance. However, in this study, IS success measurement is used to describe the desired state of IS, at the business level, in contributing to the achievement of the business objectives from the end users' perspectives.

Measuring IS success has been a major topic in IS research because it is a concept which cannot be measured directly and is therefore represented in research by various proxies. Among these are: Ease of use (Doll & Torkzadeh, 1988; Davis, 1989), Information quality (Bailey & Pearson, 1983; Doll & Torkzadeh, 1988), Use (Davis, 1989; Goodhue & Thompson, 1995) and User satisfaction (Ginzberg, 1981; Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Barki & Hartwick, 1994; Seddon, 1997). Other studies have used different measures of success, such as the extent to which the IS is used by management (Cerullo, 1980; Ginzberg, 1981; King & Rodriguez, 1978; Lucas, 1975, 1978; Zmud, 1979) or the impact of an IS on individual or organisational performance (Cerullo, 1980; Ein-Dor & Segev, 1978; Hamilton & Chervany, 1981; Kriebel, 1979; Lucas, 1975).

The research on IS success has involved four main streams: individual differences and their impacts on IS success (Agarwal, 2000; Zmud, 1979), IS success and user involvement or user participation (Barki & Hartwick, 1989; Baroudi et al., 1986; Ives &

Olson, 1984; Guimaraes & Wetherbe, 1994), fit-IS success relationship (Goodhue, 1990, 1998; Goodhue & Thompson, 1995; Vessey, 1991) and user satisfaction (Bailey & Pearson, 1983; Baroudi & Orlikowski, 1988; Doll & Torkzadeh, 1988; Ives et al., 1983).

IS failure

IS failures have been a serious problem to researchers and practitioners since late 1960s however, the problem of IS failure have become more apparent in the 1990s. Billions of dollars are wasted each year on failed projects. The media is full of reports of regular losses in the IT industry because software projects: are not delivered on time; are over budget; don't meet the expectations of users; or are of questionable quality.

There have been a number of efforts to adequately define the concept of IS failure since 1970 (Beynon-Davies, 1999). The term IS failure itself is often influenced by the perception of people who are involved in it (Jiang et al., 1999; Keil et al., 2000; Peterson et al., 2002; Poon & Wagner, 2001). While one group of researchers perceive the notion of "failure" in IS as termination of an IS due to unbearable accumulation of flaws, others consider the same notion as the inability of an IS to meet its stakeholders expectation (Beynon-Davies, 1999). Accordingly, different organisations would behave differently when coping with IS failure within their organisations. Many of the definition of IS failure often assume that technology is neutral and unproblematic (Mitev, 2000) as stated by (Wilson and Howcroft, 2002) who defined IS failure as '*System failure is constituted by the system not working properly: it does not perform as expected, it is not operational at the specified time and it cannot be used in the way intended*' (p.237). This definition, however, does not portray the full complexity of IS failure as a combination of technology and social issues.

IS failures have many facets such as undelivered functionality, schedule overturns, resistance and costs (Sauer, 1999). Costs could include risk to human life and health

while the more common cost is the wasted investments. It is clear that failures can be on different levels with many factors that need to be taken into account when they are studied.

IS failure and IS success have never been sufficiently separated for failure research to be conducted independently of the broader programme of IS implementation research. Therefore, IS failure is not a well defined concept, however, Lyytinen and Hirschheim (1987) defined IS failures as an evaluation that can be applied to a system or project of the expectations of one or many stakeholders, whereas Sauer (1993) defined a system to have failed if *“development of operation ceases, leaving supporters dissatisfied with the extent to which the system has served their interests”* (p. 4).

However, Wilson and Howcroft (2002) stated *“it appears that achieving a consensus on a definition of failure seems implausible. To an extent, the various definitions of IS failure expose more general problems of technology evaluation (for example, how do we measure success?), not to mention the issue of differing or contradictory perceptions of success and failure”* (p. 237).

There are two approaches that relate IS failure to social and organisational context (Beynon-Davies, 1999) namely concept of “expectation failure” (Lyytinen & Hirschheim, 1987) and “termination failure” (Sauer, 1993). The concept of “expectation failure” was later broadened by Lyytinen (1988) to distinguish between “development failure” and “usage failure”. IS failures have four different concepts commonly used in research studies (Lyytinen & Hirschheim, 1987):

(1) Correspondence failure: refers to failure of IS to meet the specified objectives such as staff savings and improved efficiency.

(2) Process failure: refers to outcomes of the systems development process such as a project abandonment and schedule overturns.

(3) Interaction failure: refers to failure to use an IS.

(4) Expectation failure: refers to the inability of an IS to meet a specific stakeholder group's expectation.

IS failures research has been strongly influenced by the changing dynamics of practice and by the assumptions of practice. However, there are currently an interest in IS failure studies among academics as research is focusing on different types of failure phenomena, different types of system and different sectors.

For example, IS designers from USA, Japan and Korea were explored for potential similarities and differences in their views on two IS risk factors, various types of IS failure and the overall failure rate on IS projects. The findings showed few differences between the USA and Japan and a number of differences in the views of designers from USA and Korea. The results revealed that a lack of user involvement and the lack of experienced IS personnel were perceived as greater risk factors in Korea than in the USA and Japan. Korean IS designers perceived unmet project goals and missed deadlines as more likely to contribute to IS failure than the USA and Japanese designers. These findings had a big impact on national differences in technology development and national culture (Peterson & Kim, 2003).

On the other hand, the level of support for a project is suggested to be a crucial factor (Sauer, 1993) while Wilson and Howcroft (2002) suggested that perceptions of failure/success related to the dual concepts of relevant social groups and interpretive flexibility and that it is not necessary for a technology to have changed in order for it to be perceived differently over time. The ascription of failure/ success to a given technology was a social accomplishment and depended on the perspective of the subject.

Additionally, the factors affecting the success and failure of an IS were investigated (Robey & Zeller, 1978) and it was indicated that the importance of several factors in MIS implementation. At the individual level, certain attitudes were found to be more important than others. The organizational factors of complexity, formality, and centralization also affect implementation. Lack of involvement by system developers is not sufficient to ensure failure if the vital function of explaining the system to ultimate users is assumed by some other knowledgeable person in the group and Strong management support is instrumental to system adoption.

Ewusi-Mensah and Przasnyski (1991) investigated IS projects abandonment as an aspect of IS failure in which they examined the organisational practices resulting in the IS project abandonment. The results showed that IS project abandonment is a complex multidimensional issue and could occur due to any combination of factors including cost-overruns and/or schedule slippages, technological inadequacies and behavioural, political and organisational issues. However, results revealed that the last set of factors emerged as being the most dominant in most companies' decisions.

In a more recent study, Fowler and Horan (2007) examined the development of a successful system and compared the factors associated with the system's success against the factors most reported in the literature as being associated with systems' failure. The results of the exploratory study showed that four of the six factors identified by the participants in our chosen system as being the most influential in the success of the system were directly related to the factors identified from the literature as being most associated with IS failure. The study's results showed that the factors reported by the study's participants as being associated with the success of the investigated system were: (1) top- management commitment; (2) project team commitment; (3) effective project management; (4) project personnel knowledge/skills and (5) enlisting of external contractors. In addition to "user acceptance" that was reported implicitly by many of the

study's participants and the number of direct matches increases to six. Only two items, project team commitment, and enlisting of external contractors, from the success factor list failed to correspond in some capacity to any of the previously identified failure factors.

Although much is known about the reasons for systems failures it appears that not enough is done to feed the symptoms and the gained knowledge back to the discipline in order to try to learn from past events. A typical set of common characteristics for failures reproduced from Evans et al (2002) appears below:

- Failure to apply essential project management practices
- Unrealistic management expectations and unwarranted optimism
- Effective software practices not implemented
- Premature declarations of victory
- A lack of program management leadership
- Decision-making that is untimely
- A lack of pro-active risk management

From the previous review of IS success and failure, we can conclude that There is a fundamental difficulty in defining exactly what constitutes IS success and failure, Most IT practitioners have experienced project failures at first hand and many researchers have studied the phenomena for a number of years to come up with different sets of reasons and factors purporting to influence the success or failure of projects. However, it seems that the ultimate solutions are yet to be found.

Many authors (e.g. Seddon et al, 1999; Garrity & Sanders, 1998; Wilson & Howcroft, 2002) have shown that one of the key reasons for the difficulty in defining IS success and failure is that different stakeholders view the system in highly varying ways and thus *“different measures are likely to be needed to assess the impact of effectiveness of a system for different groups of stakeholders”* (Seddon et al., 1999, p.19).

Lyytinen (1988) argued that stakeholder groups might face the failure in either the development or the use phase. In development phase, the stakeholders try to fit the IS development process to fit their interest, while in use phase the stakeholders align the IS with their ongoing concern. Ewusi-Mensah and Przasnyski (1994) while supporting Lyytinen idea, argued that IS failure is better defined as the failure in IS usage or operation, whereas the failure in the development of IS should be called project abandonment. The project abandonment itself can be categorised into three different types:

1. *Total abandonment* is where all project activities are terminated completely before the implementation.
2. *Substantial abandonment* is where major modification occurs to the project that makes it significantly different from the original specification before the implementation.
3. *Partial abandonment* is where the original specification is reduced without resulting in major changes before the implementation.

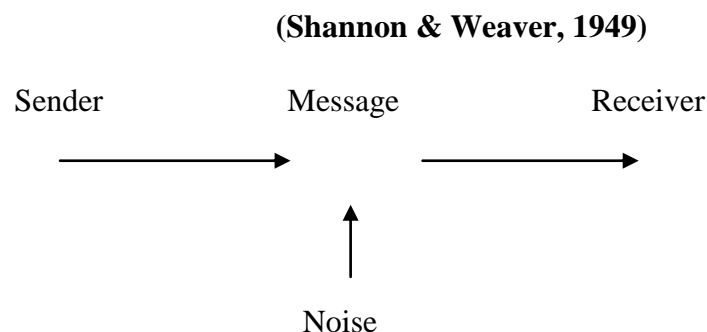
Another important question is when should we measure an IS to determine if it is successful or not? Studies have shown that IS success and failure can be measured in terms of the short-term or immediate impact, as well as the long-term or indirect impact (Garrity & Sanders, 1998). A study of an IS at the short-term stage may give a different view of its success from a study of the same system conducted at the long-term stage. The level at which IS success is measured is yet another important consideration. Garrity and Sanders (1998) defined three levels where an IS could be measured. These three levels were: (1) firm or organizational level measures of success; (2) function or process level measures of success and (3) individual measures of success. Thus, IS success and failure are considered two sides of one coin (Sauer, 1993).

However, a large number of studies have evaluated IS in different organisations; most of them have attempted either to identify factors which influenced the success of IS, or to investigate how to measure IS success (Glorfeld, 1994). DeLone and McLean (1992) focused on the dependent variable, IS success. Because DeLone and McLean were among the first researchers to introduce an IS measurement model, and because of its subsequent prominence in IS success measurement research (Bonner, 1995; Ballantine et al., 1996; Seddon, 1997; Garrity & Sanders, 1998), their work is covered in detail here.

3.3.1 Theoretical development path of DeLone and McLean (1992) Model

This section presents the development path of the DeLone and McLean (1992) model (Figure 3.2), based on initial work by Shannon and Weaver (1949) and by Mason (1978). Shannon and Weaver (1949) described communication as a process which starts when an information source selects a desired message out of a set of possible messages. The transmitter changes this message into a signal, which is then sent over the communication channel from the transmitter to the receiver. The receiver then changes the transmitted signal subjected to noise and therefore potential distortion back into a message, where the message meaning is understood and an effect results (Figure 3.1).

Figure 3.1 Shannon and Weaver Communication Theory



Then Mason (1978) adapted Shannon and Weaver's work to the IS field, as he identified that Communication is the process by which one system, P, (e.g., a mind)

affects another receiving system, R. The affected system, R, is the receiver. System P, according to Mason, consists of the hardware, software, people, data, and media, all of which are controlled by rules and procedures.

DeLone and McLean (1992) accepted that the concept of levels of output from communication theory demonstrates the serial nature of information (e.g. a form of communication). In this sense, information flows through a series of stages from its production through its use or consumption to its influence on individual and/or organisational performance. Table 3.3 presents the adoption of communication theory in the DeLone and McLean model.

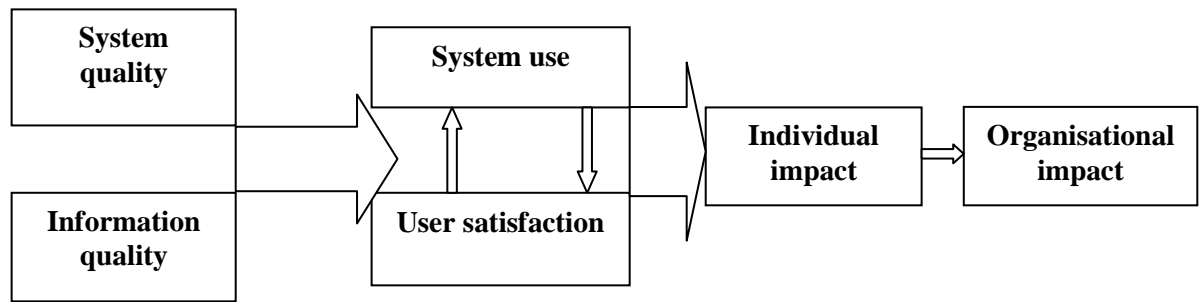
Table 3.3 DeLone and McLean's adoption of communication theory

(Ballantine et al., 1996)

Stages of communication (Shannon and Weaver, 1949)	Success categories (DeLone and McLean, 1992)
Production	System Quality
Product	Information Quality
Receipt	Information Use
Influence on Recipient	User Satisfaction Individual Impact
Influence on System	Organisational Impact

DeLone and McLean suggested that Mason's adoption of communication theory to accommodate IS measurements implied the need for success measures for the information. Building on that, they came up with a total of six distinct categories or aspects of IS: System quality, Information quality, System use, User satisfaction, Individual impact, and Organisational impact (Figure 3.2).

Figure 3.2 DeLone and McLean's model of IS success (DeLone & McLean, 1992)



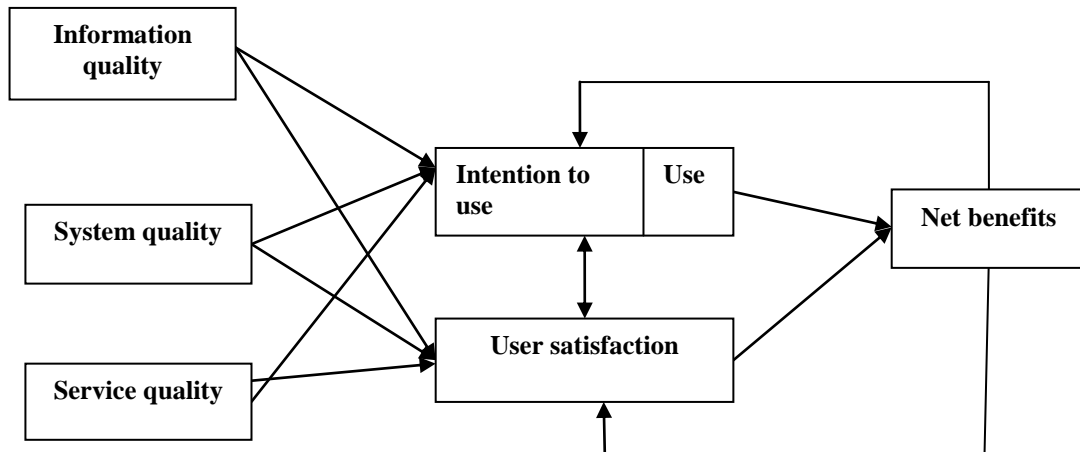
DeLone and McLean suggested furthering the research by systematically combining individual measures from IS success categories to develop a comprehensive measurement instrument. At the same time, they suggested that researchers should consider the contingency variables, such as the independent variables being researched and the environment, the technology used, and the task and individual characteristics of the system being studied.

Many empirical studies supported the left-hand part of the DeLone and McLean model, which assumed that the relationships of 'system quality and information quality' cause 'system use and user satisfaction' (e.g. Igbaria & Tan, 1997; Seddon & Kiew, 1994). However, the right-hand side of the model has not been authenticated as there have been many debates on the relationships of the right-hand side of the IS success model (e.g. Almutiari, 2001; Almutairi & Subramanian, 2005, Bokhari, 2005), which assume linear causality between system use, user satisfaction, individual impact and organisational impact.

Numerous studies have applied the whole or parts of the DeLone and McLean (1992) IS success model in different contexts and cultures. However, a number of studies challenged, criticised and/or extended the original model itself. In response to these

critics, DeLone and McLean presented their updated IS success (2003) model (Figure 3.3).

Figure 3.3 Updated IS success model (DeLone and McLean, 2003)



The primary differences between the original and updated models were:

- (1) Addition of 'service quality' to reflect importance of service and support in successful IS.
- (2) Addition of 'intention to use' to measure user attitude.
- (3) Collapsing of 'Individual impact' and 'Organisational impact' into a 'Net benefits' construct.

Although DeLone and McLean proposed an updated conceptual IS success model, it clearly needed further validation before it could serve as a basis for the selection of appropriate IS measures. In addition, researchers had to choose several appropriate success measures based on the objectives and the phenomena under investigation, as

well as consider possible relationships among the success dimensions when constructing the research model. To conclude, we may say that, despite criticisms, in the IS literature, the DeLone and McLean (1992/2003) IS success model is considered as the most comprehensive IS assessment model available (Myers et al., 1997). DeLone and McLean's model has gained wide acceptance among IS researchers who attempted to test and thus validate its usefulness (e.g. McGill et al., 2003; Garrity & Sanders, 1998; Glorfeld, 1994; Igbaria & Tan, 1997; Rai et al, 2002; Seddon, 1997; Seddon & Kiew, 1994; Teo & Wong, 1998; Wixom and Watson, 2001). This suggests that DeLone and McLean's model has gained strong theoretical and empirical support as a unified model for assessing IS success. Consequently, DeLone and McLean's model (2003) continues to be a useful tool in IS research in different contexts and can be considered as one of the most appropriate models to use as the basic building block in this study for developing a comprehensive model for assessing IS success in banking sector.

Additional variables of proposed research model

The focus to analyse IS on only technical aspects had been overcome after recent theories went far beyond technical rationales and analyse success in multi-level aspects such as organisational, socio-technical and process-based. Socio-technical theory had been one of the first to analyse the social aspect; however, it usually only focused on social and technical aspects to enhance job satisfaction. Berg (2001) enhanced this theory with specific success criteria defined as three interrelated myths - technical, socio-technical and organisational/architectural myths. Heeks (2005), on the other hand, analysed the topic with a well grounded model: the reality gap model. This model not only looked at the three success criteria defined by Berg (2001) but also included the objective/values and staffing/skills criteria which were distinct since it is crucial to have a detailed understanding of the skill set of various stakeholders, culture and political

environment. The strength of this model was to analyse the gap of the initial situation with the outcome defined by many success criteria with an emergent and improvising approach (Heeks, 2005).

However, in this study, the focus will be on success measurements, from the socio-technical viewpoint, which should capture both technological and human elements (Garrity & Sanders, 1998). Wilson and Howcroft (2002) suggested that the social studies of technology (SST) approach, which conceptualised technology as socially shaped, had a role to play in deepening our understanding of the complexity of IS failure/success and in providing us with additional insights. An effective Banking Information System (BIS) typically requires an appropriate combination of both (Davenport et al, 1998). Like most IS, BIS success partly depends upon the degree of use (Poston & Speier, 2005), which itself may be tied to system quality, information quality, service quality, user satisfaction and system usefulness. Thus, the technological dimensions (e.g. system, service and information quality) and the human dimensions (e.g. user satisfaction, perceived system benefits, user involvement, user training and system use) can be a good starting point when considering suitable constructs for measuring BIS success.

Previous research has been conducted on why systems fail or succeed. In these studies, social issues in IS development were important (Hussain & Flynn, 2004) and a key ingredient for successful systems was the relationship or involvement of the users and system designers in the system development process (Coe, 1998) and the lack of attention to these can result in IS failure.

Another researchers suggested that different 'relevant social groups' would not only define a technological problem differently but also that there would be disagreement over definitions of what constitutes success and failure (Wilson & Howcroft, 2002). For

example another group of researchers hypothesised that top management support or user attitude towards a new system were the key factors in determining system success (e.g. Lucas, 1975; Ives & Olson, 1984). On the other side, strong user involvement is the pre-eminent approach used today in the majority of systems' development projects (Coe, 1998).

In the existing IS literature, a variety of factors were found to affect IS success in general. Those included user involvement (e.g., Barki & Hartwick, 1989), management support (e.g., Leitheiser & Wetherbe, 1986; Lee, 1986), end user expectation and attitude (e.g., Maish, 1979; Robey, 1979), politics (e.g. Markus, 1983, Romi et al., 2008), task structure (e.g., Sanders & Courtney, 1985) user expertise (Guimaraes et al., 2003), user influence (Guimaraes et al., 2003), user conflict (Guimaraes et al., 2003), gender (Simmers & Anandarajan, 2001) and end user training (e.g., Nelson & Cheney, 1987). Much of the research on IS success has focused on identifying factors conducive to the success or failure of such systems. These factors include, among others, personal characteristics (e.g., Igarria, 1993, 1992; Mawhinney & Leaderer, 1990; Ginzberg, 1981; Robey, 1979), task characteristics (Saunders & Courtney, 1985), user involvement (e.g., Amoako-Gyampah, 1993; Barki & Hartwick, 1989), user training (Nelson & Cheney, 1987) and management support (Leitheiser & Wetherbe, 1986).

It is noted that individual differences in user characteristics have been incorporated into management IS design frameworks since the early 1970s (Taylor, 2004) and Dickson et al. (1977) was one of the first studies of IS identified the notion of individual differences in IS. Zmud (1979) also noted that individual differences could have significant effect on IS design and use.

Therefore, the current study selected some demographic and situational variables that are expected to have an effect on system usage and user satisfaction as intermediate

variables between those variables and the impacts on individual performance to be added to the DeLone and McLean (2003) IS success model as possible determinants of BIS success. The selection of these variables was based on the existence of literature supporting their relevance as likely determinates of system success.

3.4 IS success research

In this section, the studies which have evaluated IS success in general and in relation to DeLone and McLean model in particular are discussed. These studies investigated and analysed different dimensions of IS success and how these dimensions were related to other organisational variables.

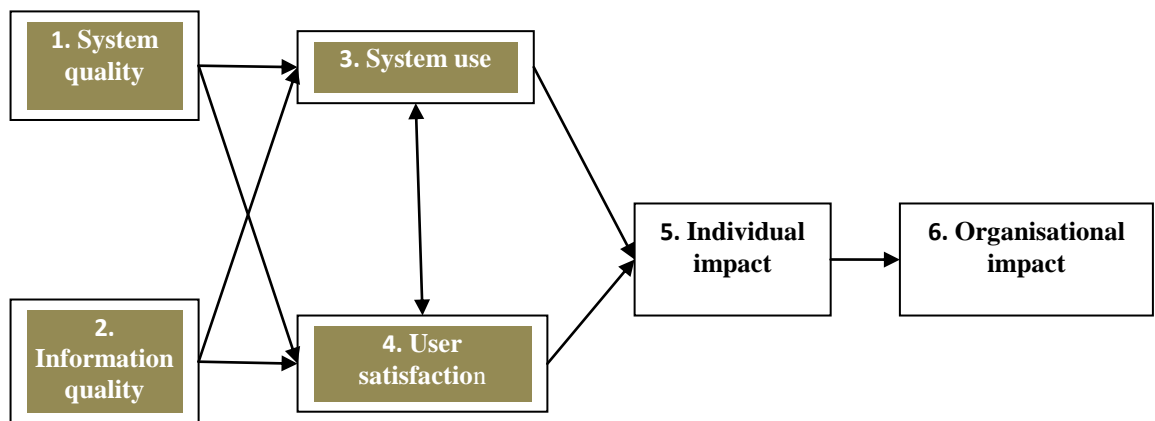
In the IS success literature, the DeLone and McLean model has been widely cited and is very influential in IS research, as between 1993 and 2002 the model was cited in 285 peer reviewed papers in journals and conference proceedings (DeLone and McLean, 2003). DeLone and McLean's taxonomy (1992) was described as being comprehensive enough to take into account all dimensions of IS success (Seddon, 1997; Ballantine et al., 1996). The model has two major contributions to IS success research. Firstly, the model provides a framework for classifying various success measures (Seddon, 1997). Secondly, the model suggests that interrelationships between the success variables are both “*temporal and causal*” in nature (DeLone and McLean, 1992, p.83).

However, there are some reserved opinions concerning the DeLone and McLean model, the interactions within it, the causal interdependences among the dimensions, and/or the process position of the dimensions. More than 20 studies have empirically tested the relationships between different variables in the model and they mostly supported it. Typically, they have adopted the whole or part of the model for a particular context and developed measures for the constructs within that context. Some extensions to the

structure of the model were suggested, for example some empirical studies supported the addition of ‘Service quality’, a concept from marketing (Pitt et al., 1995; Kettinger & Lee, 1995; Li, 1997; Wilkin & Hewitt, 1999). However, Van Dyke et al. (1999) and Seddon (1997) challenged it and claimed that ‘Service quality’ should not be viewed as part of the IS and excluded it.

However, Seddon and Kiew (1994) had tested part of the DeLone and McLean model (the shaded variables 1-4, Figure 3.4). They proposed causal paths among the six variables. The researchers tested the relationships among variables 1-4 after replacing System use with Usefulness and adding a new variable, User involvement. The findings indicated the direct association between the four variables. However, the assumption of linear causality between system use, user satisfaction, individual impact and organisational impact, has not been authenticated.

Figure 3.4 Proposed model of IS success (Seddon and Kiew, 1994)



There has been an intense debate about whether System Use is a good measure of IS success and some authors (e.g. Seddon, 1997) have suggested that it is better to remove it as an IS success variable, claiming that the ‘Use’ construct causes confusion by having three meanings at the same time:

1. 'Use' as a variable which proxies for the benefit from use.
2. 'Use' as the dependent variable in a variance model of future use.
3. 'Use' as an event in a process leading to 'Individual impact' or 'Organisational impact'.

To address these issues, Seddon first suggested 'Perceived usefulness' to replace 'System use'. He claimed that 'Perceived usefulness', 'User satisfaction', 'Individual impact', 'Organisational impact' and 'Social impact' (added to represent the impact of IS on the society) should become an aggregated construct called 'Net benefits', and he asserted the importance of clarifying who the target stakeholders are when using that construct, because of their different interests and perspectives. However, DeLone and McLean argued that system use was an appropriate measure. They asserted that the source of the problem was a too simplistic definition of system use, and that researchers must consider its extent, nature, quality and appropriateness. Simply measuring the amount of time a system is in use is not enough: informed and effective use is an important indication of IS success.

Seddon (1997) also objected to the mix of variance (causal) and process concepts within one model. According to Newman and Robey's (1992) definitions, the variance model means that any one of the independent variables is necessary and sufficient to cause variance in the dependent variable. In contrast, process models mean that each event in the process is necessary but not sufficient to cause the outcome. Seddon (1997) criticised that some of the measured causal relationships in the DeLone and McLean model (1992) were arguable and the model was incomplete. In particular, the model missed the feedback loops from individual impacts and organisational impact to user satisfaction and use. However, these feedback loops were included in the current research. Thus, Seddon proposed a respecified pure variance model depicting IS success and a partial behavioural model of IS use (discussed later in this chapter).

Other researchers added some dimensions to DeLone and McLean (1992) model (e.g. Myers et al., 1997; Ishman, 1998; Garrity & Sanders, 1995; Woodroof & Kasper, 1998; Sabherwal et al., 2006, Bradley et al., 2006). For example, the inclusion of an IT plan quality construct as an antecedent to IS success and the relationships among constructs in the model of IS success in the context of different corporate cultural types (entrepreneurial and formal) were empirically examined (Bradley et al., 2006).

A key concern in IS success research has been to better understand the linkage between IS and individual performance. Some researchers found strong relationships between IS and individual impacts. For example, significant relationships between 'System use' and 'Individual impact' and between 'System quality' and 'Individual impact' were found (Goodhue & Thompson, 1995; Teng & Calhoun, 1996; Weill & Vitale, 1999); however, the researchers did not refer to the 'End user satisfaction' and its effect on individual performance and ignored the other associations in DeLone and McLean's model.

Other researchers have used the whole or part of DeLone and McLean IS success model in specific contexts. For example, **in the context of web site success**, DeLone and McLean model was supported by using 3 variables from the model and testing them in the context of website success (Liu & Arnett, 2000). The updated DeLone and McLean IS success model was applied to examine the determinants for successful use of on-line learning systems (OLS) success (Lin, 2007). The results showed that system quality, information quality and service quality had a significant effect on actual OLS use through the user satisfaction variable and behavioural intention to use OLS. Lee et al. (2008) compared between Turkish and South Korean users of web-based filing systems. The results showed that users in the two countries felt differently about some parameters (e.g. ease of work, adequacy of amount of information, display speed,

convenience of life) and despite the complexity of the Turkish tax system, Turkish users did not find the system difficult to use. And finally, the success of website by using DeLone and McLean (1992) model was examined and it was found that the success factors varied across website types (Christian et al., 2009).

In the context of Enterprise Resource Planning (ERP) system, ERP systems were investigated in the area of offering a feasible information system strategy for higher education institutions by using a critical success factor model (Allen et al., 2002). The results suggested that a careful use of communication and change management procedures can solve some of the problems but the cost feasibility of system integration; training and user licenses may impede ERP system usage. On the other hand, the variables of information quality and system quality from the DeLone and McLean success model should be greatly modified considering the specific condition of a large mature off-the-shelf ERP package implemented in manufacturing enterprise and suggested that organisational culture was an important unique factor for ERP system implementation success (Zhang et al., 2004). Another study indicated that user evaluations were more negative in the shakedown phase. However, problems were still identified two years after system implementation as users were still not happy with the system support they received and views on system success varied depending on the ERP user background and which business process the user represented (Hakkinen & Hilmola, 2008). And finally, ERP investments were more effective in organisations with an IT governance domain consisting of proactive strategic guidance and participatory team building. In general, effective IT governance seemed to facilitate ERP success (Bernroider, 2008).

In the e-commerce domain, the factors influencing adoption of e-commerce were empirically investigated (Brown & Jayakody, 2008). The results indicated that seven

interrelated dimensions of success were confirmed: service quality, system quality and information quality, trust, perceived usefulness, user satisfaction and intentions to continue. Direct relationships were also identified and trust was associated with service and system quality. Another study found strong support that perceived dependability is needed as a significant factor for enterprise applications success. In addition, it helped managers to implement e-business successfully (Lai & Yang, 2009). An empirical analysis of DeLone and McLean's e-commerce model in the student loan industry was conducted (Cates et al., 2009). The study findings suggested that the model is an appropriate framework for measuring e-commerce success in the student loan industry. However, it was found that information quality and service quality were not related to system use and user satisfaction was also not related to system use.

In the context of Warehousing success, the relationship between system quality and net benefits and between system use and net benefits were supported and significant relationships between 'system quality' and 'individual impact' and an association between 'information quality' and 'individual impact' were found (Wixom & Watson, 2001). In another study, technical factor was found to positively influence information quality, whereas both operational and economic factors were found to have a positive effect on system quality. System quality influenced information quality which then positively affected individual benefits. Individual benefits in turn had a positive correlation with organisational benefits (Hwang & Xu, 2008).

In the Knowledge Management Systems (KMS) context, Halawi et al. (2007) suggested that as knowledge quality, system quality and service quality increase, intention to use and user satisfaction also increase, which results in an increase in KMS success.

In the context of e-government systems, a comprehensive, multidimensional model of e-government system success was proposed and validated and found that information quality, system quality, service quality, use, user satisfaction and perceived net benefit are valid measures for e-government system success (Wang & Liao, 2008). In another study, the influence of the human element in the development and operation quality of successful ISs for decision making and user satisfaction was analysed (Medina & Chaparro, 2008). The results indicated that user participation, manager support and information quality are the elements with the most effect, especially on user satisfaction. on the other hand, the impact of user involvement, user resistance and computer self-efficacy on the implementation success of a centralised identification system (CIS) at NASA Space Center was investigated (Levy & Danet, 2007). The results indicated that computer self-efficacy and user involvement were significant predictors of CIS implementation success. And finally, the importance of the technological factors were investigated in ensuring the successful use and implementation of IS in the electronic government (EG) agencies and found that IS competency and IS facilities were the two highest predictors of IS success, followed by IS integration (Hussein et al., 2007).

On the other hand, there were some empirical studies that were conducted in more than one specific context and included more than one geographic area. For example, Ishman et al. (2001) conducted a cross-cultural analysis of a hybrid model of IS success within the cultural context of North America and a former Soviet Republic, Latvia. Within the cross-cultural context of North America and Latvia, perceptions of equity in the allocation of IT resources have an important impact on successful system outcomes. Increases in perceptions of equity increased the level of satisfaction with related ISs, and consequently with the success of such systems. Agourram and Ingham (2007) tried to understand how people from different national cultures define and perceive IS

success in France, Canada and Germany. The study found that people from different national countries do not define and perceive IS success equally at the user level.

In the context of Middle East countries, a model which can be used to measure the success of ISs in public organisations in the State of Kuwait was developed (Almutairi, 2001). Initial findings of the study did not support the whole model as it was originally proposed and indicated that the IS success was a three variable model where user satisfaction affected individual impact which, in turn, affected organisational impact and satisfaction directly affected organisational impact. As a follow-up, IS success in Kuwaiti private organisations was evaluated (Almutairi & Subramanian, 2005). They added a seventh variable, the external environment, to the DeLone and McLean model to characterise the satisfaction of external actors. Also, the impact of IS on business processes' productivity in Kuwaiti public organisations was investigated (Almutairi, 2007a). The findings of the study indicated statistical evidence of the relationship between IS usage and internal process performance efficiency, coordination efficiency and customer focus efficiency. And finally, the determinants of IS use by government ministry employees in Kuwait were examined (Almutairi, 2007b). The results showed that organisational support is related to task IS and Freque-Volum IS usage, while IS expertise was found to be related to Freque-Volum IS usage and SW, usage and training was related only to SW usage.

In a user-developed application (UDA) domain, user perceptions of IS success played a significant role in the UDA domain. However, system quality did not influence perceived individual impacts and perceived individual impact did not influence organisational impact (McGill et al., 2003).

In a mandatory context, DeLone and McLean IS model was examined in a mandatory IS in Finland (Iivari, 2005). The study's findings supported the DeLone and McLean

model and the findings suggested that user satisfaction may be a reasonably good surrogate for individual impact as long as it is confined to impact on work performance.

In an attempt to correlate between the diffusion of innovation theory and IS success model, user participation was found to have strong effect on user satisfaction and user satisfaction strongly affected individual performance which in turn affected positively organisational performance (Hsu et al., 2008). Another study found strong relationship between user satisfaction and perceived usefulness (Zviran et al., 2005). However, the relationship between user satisfaction or perceived usefulness and organisational characteristics (e.g. the department to which the respondent belonged) or user characteristics (e.g. organisational level, education, age, computing experience and gender) was not supported.

To conclude we may say that DeLone and McLean (1992/2003) model have been used in many empirical studies to assess and evaluate IS success in different system contexts and country contexts. Some of these studies used some parts or whole IS model and some studies extended the model by adding some variables and different boundaries. However, from the previous literature review, it is noted that the studies that looked at IS success from the socio-technical point of view are very rare and this theoretical gap needs to be investigated. Also there were no studies that have been conducted in Egypt as well. Therefore, using the updated DeLone and McLean (2003) IS model as a conceptual background from a socio-technical perspective in Egypt seems appropriate and could fill the IS research gap in this context. The following Table 3.4 summarises the main empirical studies which applied, criticised, extended or even modified the DeLone and McLean IS (1992/2003) Success Model.

Table 3.4 Summary of main studies of IS success

Year	Author	Results
2009	Cates et al.	Empirical analysis of DeLone and McLean's e-commerce model in student loan industry. Results: model appropriate framework for measuring e-commerce success in student loan industry. However, information quality, service quality not related to system use and user satisfaction was not related to system use.
2009	Lai & Yang	Extended concept of perceived dependability into DeLone and McLean's IS success model to explore influence on success of enterprise applications in Taiwan. Results: strong support that perceived dependability needed as significant factor for enterprise applications success. In addition, helped managers to implement e-business successfully.
2009	Christian et al.	Examined the success of website by using DeLone and McLean (1992) model and found that the success factors varied across website types.
2008	Lee et al.	Compared between Turkish and South Korean users of web-based filing systems. Based on user satisfaction parameters, e.g. ease of work, adequacy of amount of information, display speed, convenience of life..etc. Users in both countries felt differently about previous mentioned parameters, despite complexity of Turkish tax system, Turkish users did not find it difficult to use system.
2008	Hsu et al.	Examined key factors for system success by adopting diffusion of innovation theory and IS success model. User participation and Observability strong effect on user satisfaction, user satisfaction strong effect on individual performance and individual performance positively effect on organisational performance.
2008	Brown and Jayakody	Investigated empirically factors influencing adoption of e-commerce. Developed a conceptual model for B2C e-commerce success. 7 interrelated dimensions of B2C e-commerce success confirmed: service, system and information quality, trust, perceived usefulness, user satisfaction and continuing intentions. Direct relationships also identified as intention to continue using online retail site directly affected by perceived usefulness, user satisfaction and system quality. User satisfaction directly related to service quality and perceived usefulness, whereas perceived usefulness influenced by trust and information quality. Finally, trust associated with service and system quality.
2008	Bernroider	Investigated role of IT governance in affecting success of enterprise resource planning (ERP) projects. Adopted D & M (2003) model and

		showed ERP investments more effective in organisations with IT governance domain consisting of proactive strategic guidance and participatory team building. In general, effective IT governance seemed to facilitate ERP success.
2008	Hwang & Xu	Developed research model to better understand critical success factors and effects on data warehousing success. 3 groups of success factors. Technical factor positively influenced information quality, whereas both operational and economic factors positively affected on system quality. System quality influenced information quality which in turn positively affected individual benefits. Individual benefits in turn had positive correlation with organisational benefits.
2008	Medina & Chaparro	Analysed influence of human element in development and operation quality of successful ISs for decision making and user satisfaction. Results: indicated that user participation, manager support and information quality elements with most effect, especially on user satisfaction.
2008	Hakkinen & Hilmola	Case study to examine long-term Enterprise Resource Planning (ERP) system success or failure in after-sales division of MNC. Questionnaire based on D & M model (2003). Indicated user evaluations more negative in shakedown phase. However, problems still identified two years after system implementation as users still not happy with system support and views on system success varied depending on ERP user background and which business process user represented.
2008	Wang & Liao	Provided test of adoption of DeLone and McLean's IS success model in context of government to citizen E-Government. Proposed and validated comprehensive, multidimensional model of E-Government system success. Information quality, system quality, service quality, use, user satisfaction and perceived net benefit valid measures for E-Government system success.
2007a	Almutairi	Investigated impact of IS on business processes' productivity in Kuwaiti public organisations. Statistical evidence of relationship between IS usage and internal process performance efficiency, coordination efficiency and customer focus efficiency in Kuwaiti ministries. 5 of 10 additional variables were found to be significant: years of service in current organisation, level of education, gender, years spent in current position and years of training in IS).
2007b	Almutairi	Investigated determinants of IS use by government ministry employees in Kuwait. Investigated effects of seven factors: IS training, tenure, IS expertise, age, education, anxiety and organisational support). IS usage included three factors: extent of IS use in tasks (Task IS), volume and frequency of IS use (Freque-Volum IS usage) and number of packages

		in which IS used (SW usage). Organisational support related to task IS and Freque-Volum IS usage, while IS expertise related to Freque-Volum IS usage and to SW usage and training only related to SW usage.
2007	Hussein et al.	Investigated influence of technological factors on up-stream model of D & M IS success dimensions. Indicated all technological factors included significantly correlated to 4 IS success dimensions and IS competency and IS facilities were two highest predictors of IS success followed by IS integration. Also emphasised importance of technological factors investigated in ensuring successful utilisation and implementation of ISs in EG agencies.
2007	Agourram & Ingham	Exploratory research to analyse qualitative data collected from participants working in single MNO subsidiaries in France, Canada and Germany. People from different national countries do not define and perceive IS success equally at the user level.
2007	Levy & Danet	Investigated impact of 3 variables: user involvement, user resistance and computer self-efficacy on implementation success of centralised identification system (CIS) at NASA Space Center. Results: computer self-efficacy and user involvement significant predictors of CIS implementation success.
2007	Lin	Applied updated D & M IS success model (2003) to measure and examine determinants for successful use of on-line learning systems (OLS). Results: expanded understanding of factors measuring OLS success and system quality, information quality and service quality had significant effect on actual OLS use through user satisfaction variable and behavioural intention to use OLS.
2007	Halawi et al.	Tested and supported D & M updated model (2003) and proposed model to measure success of knowledge management systems within knowledge-based organisations. Suggested that as knowledge quality, system quality, and service quality increase, intention to use and user satisfaction also increase, which results in increase in success.
2006	Bradley et al.	Provided strong support for research model and suggested variations in IS success could be explained and affected contingency and antecedents variables such as quality of IT plan and corporate culture of firm in which they significantly affected relationships between constructs in D & M.
2006	Sabherwal	Tested comprehensive theoretical model which explained interrelationships among 4 IS constructs (system quality, perceived usefulness, system use, user satisfaction) and 6 other constructs (user experience with ISs, user training in ISs, user attitude towards ISs, user participation in development of ISs, top management support for ISs, and facilitating conditions for ISs). Indicated importance of latter 6

		variables in IS success.
2005	Almutairi & Subramanian	Evaluated IS success in Kuwaiti private organisations. Findings did not support D & M's model as formally proposed and indicated IS success was 3 variable model, in which Satisfaction influences Individual impacts and in turn influences Organisational impacts, and Satisfaction directly influences Organisational impacts.
2005	Iivari	Supported D & M model and suggested user satisfaction may be reasonably good surrogate for individual impact as long as confined to impact on work performance.
2005	Zviran et al.	Empirical examination of two success indicators: user satisfaction and perceived usefulness in context of Enterprise Resource Planning (ERP). Results: high levels of user satisfaction and perceived usefulness in comparison to other systems, strong relationship between user satisfaction and perceived usefulness: relationship between user satisfaction or perceived usefulness and organisational characteristics (e.g. department of respondent) or user characteristics (e.g. organisational level, education, age, computing experience and gender) not supported.
2004	Zhang et al.	Variables of Information quality and System quality from D & M success model should be greatly modified, considering specific condition of large mature off-the-shelf ERP packages implemented in manufacturing enterprises and suggested organisational culture important unique factor for ERP system implementation success.
2003	McGill et al.	Indicated user perceptions of IS success played significant role in UDA domain. However, further research required to understand relationship between user perceptions of IS success and objective measures of success, and to provide appropriate model of IS success to end user.
2002	Allen et al.	Investigated whether ERP systems offer feasible IS strategy for higher education institutions, using a critical success factor model. Results: careful use of communication and change management procedures can solve some of the problems but the cost feasibility of system integration; training and user licenses may impede ERP system usage.
2001	Almutiari	PhD research to measure success of IS within public organisations in State of Kuwait. Initial findings did not support model as originally proposed and indicated IS success was 3 variable model. Proposed that satisfaction affected individual impact which, in turn, affected organisational impact. Also, satisfaction directly affected organisational impact.
2001	Ishman et al.	Indicated some factors affecting managerial IS success had built-in value biases reflecting value orientations of culture in which developed. Results significant to both practitioners and researchers attempting to

		identify factors affecting managerial IS success and their application in cross-cultural environments (North America and Latvia).
2001	Wixom & Watson	Significant relationship between System quality and Individual Impact, and association between Information quality and Individual impact.
2000	Liu & Arnitt	Supported DeLone and McLean's model by using 4 variables from model and testing in context of websites success: information quality, system quality, system use, and service quality.
1999	Weill & Vitale	Significant relationship between System use and Individual impact, but did not test relationships between other variables in model.
1999	Wilkin & Hewitt	Supported addition of Service quality to model.
1998	Ishman	Broke D & M model into four levels: Individual, Dyad, Group and Organisational and added Group impact dimension which precedes Organisational impact dimension in D & M model.
1998	Woodroof & Kasper	Expanded User satisfaction dimension into each of these new 4 dimension parts: Process User Satisfaction and Dissatisfaction, and Outcome user Satisfaction and Dissatisfaction.
1997	Li	Supported addition of Service quality to D & M model.
1997	Myers et al.	Added 2 dimensions: Group impact and Service quality plus 2 contingency factors: External environment and Organisational environment.
1997	Seddon	Claimed Service quality should not be viewed as part of IS, excluded it, and objected to perceived mix of variance and process concepts within one model.
1996	Teng & Calhoun	Significant relationship between System Use and Individual Impact but ignored other associations in D & M model.
1996	Ballantine et al.	Introduced a 3 dimensional model using some aspects of D & M model but with major changes to focus on ISs rather than information.
1995	Pitt et al.	Proposed extending model by adding Service quality.
1995	Kettinger & Lee	Extended D & M model by adding service quality variable.
1995	Garrity & Sanders	Added 4 dimensions: Task support satisfaction, Quality of work life satisfaction, Interface satisfaction, and Decision making satisfaction.
1995	Goodhue et al.	Significant relationship between System use and Individual impact and between System quality and Individual impact, but no reference to end user satisfaction and effect on individual performance.
1994	Seddon & Kiew	Tested part of D & M model after replacing Use with Usefulness and adding new variable User involvement. Found support for relationships between specified variables.

To summarise, it appears that there has not been any study attempting to validate the DeLone and McLean model (2003) from the socio-technical perspective in Egypt. Therefore there is a need to develop a comprehensive model for assessing IS in the Egyptian banking industry; unfortunately, there have been few studies (empirical or conceptual) in the banking sector which could be used as a basis for building a comprehensive model for assessing those ISs. However, models developed to assess IS success in other sectors or industries can be modified for use in the banking sector.

3.5 Research on IS success in banking industry

As the field of IS grows, the BIS literature has not matured to meet the needs of practice. Given that banks invest billions in the ISs infrastructure, one particular area in urgent need for further exploration is the measuring and evaluating of IS currently in the banking sector. With the substantial investment in ISs and the push to develop performance-based banking organisations, banking CEOs and managers are handicapped by the lack of appropriate models and instruments to measure the success of IS and, in turn, are unable to justify investments in existing and future IS. In this section, research in the banking sector which tried to measure IS success in different contexts are reviewed and presented.

Some prior studies investigated the relationships between the IS effectiveness and efficiency and various variables. For example, user satisfaction and system usage were found to be associated with some of the investigated personal and contextual variables (Elnady & Elkordy, 1997). User satisfaction was associated positively with age, organisational level and user involvement; systems usage was associated negatively with age, organisational level and education. Nevertheless, these findings should be cautiously interpreted, given that most of the computer-based IS investigated in this study were MIS systems. On the other hand, the analysis of theoretical frameworks to

explore the link between IS investments and a bank's efficiency was strongly needed and top IS professionals also felt strongly the need for developing more rigorous cost-benefit methodologies to help them sell the technology to top management (Gupta & Collins, 1997).

In the context of IT adoption and implementation in the banking sector, a study in the Malaysian banks indicated that these banks could be placed in two groups by reasons for adopting the electronic delivery systems (Adham, 1999). For the local banks, the adoption decisions were mainly triggered by the competitive conditions. As for the foreign banks, the adoption process was mainly pushed by their parent companies. The study also revealed that the adoption and implementation activities could be explained by the existing innovation process model for the local banks. In another study in the Omani financial sector, the lack of top management support was one of the most important factors inhibiting EC adoption (Khalfan & Alshawaf, 2004). Information privacy and security issues were found to be serious inhibiting factors on the successful adoption and use of electronic banking applications in the Omani financial sector as well. Factors like power relationships (e.g. conflict between managers arising during the IS/IT adoption) and lack of investment in EC applications were identified as less significant inhibiting factors.

In a mandatory environment, the perceived ease of use had a strong effect on the end user satisfaction. Some demographic variables such as age, position in a company and the length of employment were significant influencers of user satisfaction (Adamson & Shine, 2003).

In the context of online and electronic banking, the implications of adopting this technology on various aspects of the banking sector are presented in this section. The effect of an extension of the Technology Acceptance Model (TAM) and the addition of

trust variable on the adoption and usage of advanced banking technologies were examined (Kamel & Hassan, 2003). The study found that trust had a highly significant effect on perceived ease of use and a less significant effect on perceived usefulness. Another study suggested that perceived enjoyment, information on online banking and security and privacy had an impact on the acceptance of online banking but quality of Internet connection did not suit (Pikkarainen et al., 2004). The findings also indicated that perceived usefulness and information on online banking on the Web site were the main factors influencing online-banking acceptance. The factors that affected customers' continued usage of UK online banking services were investigated (Liu & Louvieris, 2006). The study the TAM and added two more variables: trust and commitment. The study strongly supported the adopted TAM for online banking in predicting customers' retention. In a recent study, the updated DeLone and McLean (2003) IS success model was used to propose a framework to investigate website success factors and their relative importance in selecting the most preferred e-banking website in Iran (Salehi & Keramati, 2009).

In a Web-based survey to verify and test banking online service quality model, a confirmatory factor analysis produced six key online service quality dimensions: reliability, responsiveness, competence, ease of use, security and product portfolio (Yang et al., 2004a). In another study, three dimensions, notably reliable/prompt responses, attentiveness and ease of use, had significant impacts on both customers' perceived overall service quality and their satisfaction on online banking service quality (Yang et al., 2004b). Also, the access dimension had a significant effect on overall service quality, but not on user satisfaction and the study also discovered a significantly positive relationship between overall service quality and satisfaction. Finally, Yang and Fang (2004) indicated that primary service quality dimensions leading to online customer satisfaction, with the exception of ease of use, were closely related to

traditional services, while key factors leading to dissatisfaction were tied to IS quality. In addition, major drivers of satisfaction and dissatisfaction were identified at the sub-dimensional level.

In the context of End-User Computing Satisfaction (EUCS), three constructs (content, ease of use and accuracy) were supported, indicating that the modified EUCS model (labelled EUCS2) can be used in analysing user satisfaction with online banking among private customers in Finland (Pikkarainen et al., 2006).

In the domain of mobile banking, self-efficiency was found to be the strongest antecedent of perceived ease-of-use, which directly and indirectly affected behavioural intention through perceived usefulness in mobile banking (Lee et al., 2009). This research verified the effect of perceived usefulness, trust and perceived ease-of-use on behavioural intention in mobile banking. Another research model, based on DeLone and McLean's mode was proposed, to assess how system quality, information quality and interface design quality affect consumer trust and satisfaction with mobile banking in Korea (Lee & Chung, 2009). The study showed that system quality and information quality significantly influenced customers' trust in and satisfaction and that interface design quality did not. The following Table 3.5 summarises the studies which investigated the success of BISs.

Table 3.5 Studies of IS success in banking field

Year	Author	Results
2009	Lee et al.	Examined and validated determinants of users' intention to mobile banking. Results: self-efficiency was the strongest antecedent of perceived ease-of-use, which affected behavioural intention through perceived usefulness in mobile banking. Structural assurances are the strongest antecedent of trust, which could increase behavioural intention of mobile banking. This research verified the effect of perceived usefulness, trust and perceived ease-of-use on behavioural intention in mobile banking.
2009	Lee & Chung	Proposed a research model, based on DeLone and McLean's mode, to assess how

		system quality, information quality and interface design quality affect consumer trust in and satisfaction with mobile banking in Korea. The study showed that system quality and information quality significantly influenced customers' trust and satisfaction and that interface design quality did not.
2009	Salehi & Keramati	Used the updated DeLone and McLean (2003) IS success model to propose a framework to investigate website success factors and their relative importance in selecting the most preferred e-banking website in Iran.
2006	Liu & Louvieris	Investigated factors affecting customers' continued usage of UK online banking services. Used Technology Acceptance Model (TAM) and added 2 additional variables: trust and commitment. Strongly supported adopted TAM for online banking in predicting customers' retention.
2006	Pikkarainen et al.	Aimed to test and validate End-User Computing Satisfaction (EUCS) model to investigate online banking users' satisfaction with service in Finland. Results supported three constructs (content, ease of use and accuracy) from original model, indicating that modified EUCS model (EUCS2) can be used in analysing user satisfaction with online banking among private customers.
2004	Pikkarainen et al.	Investigated consumer acceptance of online banking in Finland using technology acceptance model (TAM). Perceived usefulness and information on online banking on Web site main factors influencing online-banking acceptance.
2004	Yang & Fang	Aimed to extend understanding of service quality and customer satisfaction within setting of online securities brokerage services. Primary service quality dimensions leading to online customer satisfaction, with exception of ease of use, closely related to traditional services while key factors leading to dissatisfaction are tied to IS quality. In addition, major drivers of satisfaction and dissatisfaction identified at sub-dimensional level.
2004 a	Yang et al.	Attempted to set forth reliable and valid means of measuring online service quality based on broad conceptual framework integrating theory and conceptualisation in customer service quality, IS quality and product portfolio management. Confirmatory factor analysis produced 6 key online service quality dimensions: reliability, responsiveness, competence, ease of use, security and product portfolio.
2004 b	Yang et al.	Revealed some important findings about online service quality. Identified 6 key online retailing service quality dimensions as perceived by online customers: reliable/prompt responses, access, ease of use, attentiveness, security and credibility. Of these, 3 notably reliable/prompt responses, attentiveness and ease of use had significant impacts on both customers' perceived overall service quality and satisfaction. Also, access dimension significant effect on overall service quality, but not on satisfaction. Finally, significantly positive relationship between overall service quality and satisfaction.

2004	Khalfan & Alshawaf	Explored potential impeding factors that could inhibit wide adoption and use of electronic commerce (EC) applications in Omani banking industry. One of most important factors was lack of top management support. Information privacy and security issues serious inhibiting factors.
2003	Adamson & Shine	Investigated bank's treasury concerns on staff acceptance of new operating platform and identified areas of practical management action to improve staff acceptance and then improve hoped for productivity. Results: in a mandatory environment, perceived ease of use had a strong effect on end user satisfaction. Some demographic variables such as age, position in company and length of employment were significant influencers of satisfaction.
2003	Kamel & Hassan	Empirical study to assess introduction of electronic banking in Egypt, using the Technology Acceptance model (TAM). Focused on identification of main environmental factors affecting Egyptian banking sector in general and electronic retail banking delivery channels in particular. Trust had high significant effect on perceived ease of use and less significant effect on perceived usefulness.
1999	Adham	PhD study on adoption and implementation of IT in Malaysian commercial banks. Results: Malaysian banks could be placed in two groups by reasons for adopting electronic delivery systems. For local banks, adoption decisions mainly triggered by competitive conditions. For foreign banks, adoption process mainly pushed by parent companies.
1997	Elnady & Elkordy	Explored relationship between personal and situational characteristics of IS users and systems effectiveness, in Egyptian banks. Suggested user satisfaction and system usage associated with some investigated personal and situational variables. Focused only on some potential personal and situational variables and effect on IS effectiveness, but did not address updated DeLone and McLean model as a whole.
1997	Gupta & Collins	Empirical study to investigate contribution of IS to banks in Florida, USA. Found lack of rigorous analysis and theoretical frameworks to explore link between IS investments and bank efficiency. Further, top IS professionals feel strong need for developing more rigorous cost-benefit methodologies to help them sell technology to top management. Also, traditional measures of productivity, such as decrease in operating costs and increase in profits, continue as most popular measures of efficiency and ROI, although may not be suitable for IS and technologies.

To conclude, numerous studies were conducted in the banking context related to different aspects of IS such as on line banking and adoption, implementation of IS, different levels of analysis and different countries. However, from the previous literature of IS in the financial sector in general and the banking industry in particular, we can conclude that most of these studies focused on some of the DeLone and McLean

IS success dimensions. There is obviously a scarcity in the studies adopting the DeLone and McLean (2003) model with all its variables and its interrelationships from a socio-technical perspective in the banking industry taking into consideration the individual differences and their impacts on IS usage and satisfaction. There was thus no single study which adopted the updated DeLone and McLean (2003) model of IS success or extended it in the Egyptian banking context. In addition, it has been indicated that there are no published or systematic data available in Egypt relative to the evaluation of ISs in the banking sector despite the huge IS expenditure which put bank practitioners, CIOs and COEs under pressure to cut costs and account for money spent. Individual banks have carried out *ad hoc* surveys on an irregular basis, but the implications of these have been largely non-scientific, had no fixed objectives and were certainly not available for publication. Therefore, this study is an attempt to fill this IS research gap by trying to measure the success of the BISs through proposing a conceptual IS success model which could be used to investigate the success of Egyptian BIS from the managers' perspectives.

3.6 Dimensions and variables of proposed research model

Measurement of IS' success is one of the issues that, over the years, has generated much interest among IS researchers and practitioners (Srinivasan, 1985). Approaches suggested and used to measure IS success can be grouped into three categories of measures (DeLone & McLean, 1992; Ives & Olson, 1984; Zmud, 1979): (1) performance-related, (2) system usage and (3) user satisfaction. All have advantages and disadvantages. However, user satisfaction and system usage are two of the oldest and most often used in IS research which has attempted to identify IS success factors (e.g., DeLone & McLean, 1992; Melone, 1990; Lucas, 1975a, 1978; Zmud, 1979; Schewe, 1976; Ives et al., 1983). But how do we determine the measures of success? What measurements determine if a system has succeeded or failed? There are four generally accepted measurements for assessing

system success:

- Payoff to the organisation
- Favourable attitudes towards system on the part of users
- Use of system measured by intended or actual use of system
- Degree to which system accomplishes its original objectives

All measures do not apply to all systems. It is important to consider the type of system, key system applications and whether system usage is mandatory or voluntary when establishing measures of success.

Despite the multidimensional nature of IS success, an attempt should be made to reduce significantly the number of measures used to measure IS success so that research results can be compared and findings validated. The selection of IS dimensions and measures should be dependent on the objectives and context of the empirical investigation but, where possible, tested and proven measures should be used (DeLone & McLean, 2003).

In this section, the updated DeLone and McLean's (2003) model is used to organise the findings of the studies which investigated IS success. Several proxies of IS success are discussed and justification for the inclusion of these variables (and the new demographic and contextual added variables) in the research model is introduced. Therefore, this review focuses on two dimensions:

- (1) Identifying key variables and relationships among them.
- (2) Presenting the hypotheses of the current research.

3.6.1 System Quality

System quality (software) is defined as the absence of defects (Chow, 1985), any failure of an application to carry out its predicted intentions (Franz & Robey, 1986) and

because the systems are becoming more complex (Rai & Al-Hindi, 2000), it is important to increase productivity and the quality in their development (Hull et al. 2002). Bennatan (2000) identified difficulty to establish quality metric definitions as these will depend on the needs of every organisation, but, the IS quality is available when it has enough quality elements, concretely of information (Hamill et al., 2005).

However, DeLone and McLean (2003) found that system quality was measured in terms of performance, e.g. portability, integration, facility in use, reliability, data quality and flexibility. It is concerned with whether there are errors in the system, its ease of use, response time, flexibility and stability. This latter definition will be adopted in this study and these criteria are equally applicable in measuring Banking Information System (BIS) success.

- **Relationship between system quality and system use**

System quality has been examined extensively in the IS research literature as a contributor to IS success and has been widely accepted among researchers (e.g. Doll & Torkzadeh, 1988; Davis, 1989; Guimaraes et al., 2007). Studies examining IS quality used features of the systems themselves to assess quality. Some evaluated ISs by investigating how they used organisational resources such as materials and financial resources (Alloway, 1980), used the concepts of reliability, response time and ease of terminal use (Swanson, 1974) and used the content of the database, aggregation of details, human factors and system accuracy (Emery, 1971). A longer response time was found to be related to decreased user satisfaction with the system, which supported the importance of the user's perceptions of the system quality (Conklin et al., 1982).

Using a different approach, a number of studies have evaluated the quality of ISs by examining organisational effectiveness and identifying factors which should be present

in an organisation to ensure a high quality IS. Greater user involvement in all IS development stages was related to greater perceived usefulness (as a surrogate measure of system quality) (Franz & Robey, 1986). There was also a relationship between user involvement and group process skills, such as the ability to adapt to change, communication skills, level of conflict and agreement and IT effectiveness (Kaiser & Srinivasan, 1980). However, the relationship between participation and perceived worth of the system as a surrogate for system quality was supported but participation did not lead to an increase in system usage (King & Rodriguez, 1981).

In addition, perceived usefulness (the effects of the system on work) and perceived ease of use (whether it is easy to use and interact with system), as two surrogates of system quality were found to be associated with system acceptance (current and future usage) (Davis, 1989). On the other hand, usefulness (the belief that the IS is useful in job performance) was affected by perceived ease of use (the extent that an IS is friendly) (Karahanna & Straub, 1999).

User satisfaction and system usage as appropriate indicators of decision -making effectiveness (system quality) were tested (Yuthas & Young, 1998). The study concluded that user satisfaction and system usage measures were not acceptable alternatives to direct performance measurement. Further, system quality and information quality were found to be significant determinants of overall user satisfaction (Seddon & Kiew, 1994).

Similarly, Rai et al. (2002) reported significant path coefficients between ease of use (used to measure system quality) and user satisfaction and between information quality and user satisfaction in their analysis of the DeLone and McLean model. In a more recent empirical study, the relationship of system quality and its main outcomes was investigated (Guimaraes et al., 2007). The study indicated the importance of system

quality and its main outcomes which have been previously studied separately by different researchers and corroborated the importance of system quality as a determinant of system usage, company benefits derived from the system and the system impact on the user's job.

To conclude, there is mixed support for the relationship between system quality and system use at the individual level of analysis within the literature. Many studies measured system quality as perceived ease of use and found positive relationships with various operationalisations of use in a variety of systems at the individual level of analysis (e.g., Iivari, 2005; Petter et al., 2008; Rai et al., 2002; Goodhue & Thompson, 1995; Hsieh & Wang, 2007). However, other research has found that perceived ease of use was weakly related to actual use (Straub et al., 1995). Yet Adams et al. (1992) have found that perceived ease of use was negatively related to system use. In a recent study, Kositanurit et al. (2006) found that reliability of an Enterprise Resource Planning (ERP) system did not have an effect on utilisation of the system by individual users. Thus, this study proposes the following hypothesis:

H1a: There is a positive relationship between perceived system quality and system use.

- **Relationship between system quality and user satisfaction**

At the individual unit of analysis, there is strong support for the relationship between system quality and user satisfaction in the knowledge management system context and in general IS (Iivari, 2005; Gelderman, 2002; Wu & Wang, 2006; Halawi et al., 2007; Seddon & Yip, 1992; Seddon & Kiew, 1996; McGill et al., 2003; Almutairi & Subramanian, 2005). Therefore, the following hypothesis is tested:

H1b: There is a positive relationship between perceived system quality and user satisfaction.

- **Relationship between system quality and individual impacts**

The relationship between system quality and individual impacts has moderate support in the literature. In general, there is a positive impact on individual performance (Kositanurit et al., 2006; Bharati & Chaudhury, 2006; Amoli, 1996; Goodhue, 1995; Seddon & Kiew, 1994; Wixom, 2001). However, other researchers found no relationship between system quality and individual impact (Goodhue & Thompson, 1995; McGill and Klobas, 2005). This leads to the following hypothesis:

H1c: There is a positive relationship between perceived system quality and individual impacts.

3.6.2 Information Quality

Quality information is an important asset for organisations and is a way for surviving and giving a competitive advantage. There have been many studies which defined information quality (e.g. DeLone & McLean, 2003; Pitt et al. 1995); however, the current study defines information quality as exact, opportune, reliable, relevant, complete and precise.

- **Relationship between information quality and system use**

Information quality has a long history as an important construct in the presentation and determination of IS success. Many researchers studying the information quality dimension have examined IS output (e.g. information quality from the users' perspective) and how several organisational variables are positively related to information quality in different contexts such as DSS, EIS and MISs (e.g. Gallagher, 1974; Mahmood & Medewitz, 1985; Blaylock & Rees, 1984; Jones & McLeod, 1986; Elnady & Elkordy, 2005).

However, few studies have examined the relationship between information quality and system use at the individual level of analysis. One reason for this is that information quality tends to be measured as a component of user satisfaction measures, rather than being evaluated as a separate construct (Petter et al., 2008). Nevertheless, information quality was significantly related to use (Rai et al., 2002) and to intention to use in the knowledge management system context. Yet two other studies found that information quality was not significantly related to intention to use (McGill et al., 2003; Iivari, 2005). Goodhue and Thompson (1995), in their study of task-technology fit, found that information quality was not significantly related to utilisation. Therefore, the following hypothesis examines the relationship between information quality and system use:

H2a: There is a positive relationship between perceived information quality and system use.

- **Relationship between information quality and user satisfaction**

On the other hand, the relationship between information quality and user satisfaction was strongly supported in the literature (e.g. Iivari, 2005; Wu & Wang, 2006). Studies have found a consistent relationship between information quality and user satisfaction at the individual unit of analysis (e.g., Seddon and Yip, 1992; Seddon and Kiew, 1996; Rai et al., 2002; McGill et al., 2003; Almutairi & Subramanian, 2005; Halawi et al., 2007). Studies especially examining the information quality aspects of websites have found significant relationships between content and layout and user satisfaction. Thus, the following hypothesis is proposed:

H2b: There is a positive relationship between perceived information quality and user satisfaction.

- **Relationship between information quality and individual impacts**

There is moderate support for the positive impact of information quality on individual performance (Petter et al., 2008). For example, information quality was related to decision-making efficiency (Gatian, 1994). DeLone and McLean (1992) identified three studies which tested the relationship between information quality and individual impacts and found the association to be significant. Information quality was measured in terms of accuracy, timeliness, completeness, relevance and consistency. Individual impacts were measured in terms of decision-making performance, job effectiveness and quality of work (Amoli, 1996; Seddon & Kiew, 1994; Wixom, 2001).

Information quality was also found to be related to decision-making satisfaction (Bharati & Chaudhury, 2006) and to quality of work and time-savings (D'Ambra & Rice, 2001; Shih, 2004). Perceived information quality was also significantly related to perceived usefulness (e.g., Seddon & Kiew, 1996; Rai et al., 2002; Shih, 2004; Wu & Wang, 2006). Thus the following hypothesis is tested:

H2c: There is a positive relationship between perceived information quality and individual impacts.

3.6.3 Service Quality

Nowadays, the IS services are more important, because the system mainly provides services to stakeholders and with the arrival of the end-user computing in the middle of the 1980s, the organisations had to play two roles: information and service suppliers (Jiang et al. 2001). IS departments provided a wide range of services to their users and they have expanded their roles from product developers and operations managers to become service providers. The departments have always had a service role because they assist users in converting data into information and this conversion has the typical

characteristics of a service. Thus the quality of IS department service, as perceived by its users, is a key indicator of IS success (Moad, 1989; Rockart, 1982). The principal reason why IS departments measure user satisfaction is to improve the quality of service they provide and if researchers ignore service quality, they may get an inaccurate assessment of IS success (Conrath & Mignen, 1990).

Service quality refers to the general judgement or attitudes in the evaluation of the level of services given by the IS department and the personnel support as IS service quality is intangible, it is not kept in stock and the users' attitudes are difficult to measure (Reeves & Bednar, 1994). Therefore, it is necessary to evaluate the IS services even if it is subjectively evaluated (e.g. Kettinger & Lee, 1995; Reeves & Bednar, 1994).

The process of service quality performance includes the staff, the facilities and the adequate equipment. It also includes the services given to the users with accuracy, opportunity and pleasantness, the staff knowledge and giving the required special and personalised attention (Wilkin et al., 2004) because the computer users do not need a machine, they want a system which satisfies their information and computing needs (Pitt et al., 1995). In the current study, the definition of Reeves and Bednar will be adopted.

There are two possible units of analysis for IS service quality: the IS department and a particular IS. In those cases where users predominantly interact with one system (e.g., sales personnel taking telephone orders), a user's impression of service quality is based almost exclusively on one system. In this case, the unit of analysis is the IS. In situations when users have multiple interactions with the IS department (e.g., a personnel manager using a HRM system, electronic mail and a variety of personal computer products), the unit of analysis can be a particular system or the IS department.

Thus, while system quality and information quality may be closely associated with a particular software product, this is not always the case with service quality. Irrespective of whether a user interacts with one or multiple ISs, the quality of service can influence use and user satisfaction (Pitt et al., 1995).

In the current research, the main emphasis will be on the IS department rather than a particular IS. Service quality, properly measured, deserves to be added to system quality and information quality as a component of IS success. It could be argued that service quality is merely a subset of system quality, but the changes in the role of IS over the last decade give reason to add the service quality dimension as a separate variable. So, the importance of the present research may come from the scarcity of studies which included service quality as a measure of IS success. One of the tools most widely used to measure the service quality is SERVQUAL, which helps the researchers to measure the service quality in IS (Pitt et al. 1995), developed by Parasuraman et al. (1985). The IS service quality in the current study is divided into five dimensions, which are those of the SERVQUAL measurement instrument which were used to measure service quality: Tangibility, Reliability, Responsiveness, Assurance and Empathy.

- **Relationship between service quality and system use**

There is a little literature which examines the relationship between IS service quality and system use at the individual level of analysis. For example, this relationship was tested by examining accounting IS in Korean firms (Choe, 1996). The study found that the number of years' experience of the IS support personnel was weakly related to frequency and willingness to use. In another study, documentation of a system was not a predictor of utilisation in a survey of ERP users (Kositanurit et al., 2006). A study of knowledge management systems found that service quality did not predict intention to use (Halawi et al., 2007). Thus, the following hypothesis is tested:

H3a: There is a positive relationship between perceived service quality and system use.

- **Relationship between service quality and user satisfaction**

Several studies have examined the relationship between service quality and user satisfaction; however, the results of these studies suggested mixed support for it. Researchers have measured service quality using multiple methods, which may account for the inconsistent findings (Petter et al., 2008). By using the SERVQUAL instrument, service quality was positively and significantly related to user satisfaction with information services in a survey of undergraduate students using the university's computing services department (Kettinger & Lee, 1994; Shaw et al., 2002) and a significant relationship between service quality, measured by SERVQUAL, and user satisfaction in a knowledge-management context (Halawi et al., 2007). However, Aladwani (2002) did not find support for this relationship. Another study of websites did not find an association between feedback, assistance and frequently asked questions and user satisfaction with the website (Palmer, 2002). Therefore, the following hypothesis is proposed:

H3b: There is a positive relationship between perceived service quality and user satisfaction.

- **Relationship between service quality and individual impacts**

The relationship between service quality and individual impacts has moderate support at the individual level of analysis (Petter et al., 2008). However, IS service quality was found to focus in to the users and helped to reach the organisational objectives while their own needs were met (Kettinger & Lee, 1995). Additionally, external computing support was related to perceived system usefulness but the internal computing support was not related to system usefulness (Igbaria et al., 1997). In a case study on improving

service quality, Blanton et al. (1992) found that personalised IT support is more effective than generalised. However, the developers' skills for an expert system were not significantly related to the impact on the user's job (Yoon & Guimaraes, 1995). In the context of ERP systems, no relationship between documentation of ERP systems and individual perceived performance was found (Kositanurit et al., 2006). Thus, this study proposes the following hypothesis:

H3c: There is a positive relationship between perceived service quality and individual impacts.

3.6.4 System Use

Firstly, system use is one of the most frequently assessed categories in measuring IS success (Straub et al., 1995). The use of an IS or IS report or output is one of the most frequently reported measures of the success of an IS (DeLone & McLean, 1992). The measurement of use has been the topic of much controversy throughout IS research literature. A number of conceptual studies proposed the use of information as the measure of IS success (Ein-Dor & Segev, 1978; Hamilton & Chervany, 1981; King & Rodriguez, 1978; Lucas, 1975).

- **Relationship between system use and user satisfaction**

At a general level, there is some empirical research on the relationship between user satisfaction and system use, which suggests that the relationship is positive but relatively weak (e.g. Amoroso & Cheney, 1991; Barki & Huff, 1985; Ginzberg, 1981; Nelson & Cheney, 1987; Baroudi et al., 1986). On the other hand, the DeLone and McLean model assumed that as use demonstrated that a system meets a user's needs, satisfaction with the system should increase, which should lead to further use of that system. Conversely, if system use does not meet the user's needs, satisfaction will not

increase and further use will be avoided. This explanation suggests that IS use precedes user satisfaction or that the relationship is reciprocal.

Numerous studies have investigated the relationship between system use and user satisfaction (e.g. Ginzberg, 1981; Baroudi et al., 1986; Iivari, 1987; Kim et al., 1998). For example, three proposals related to system usage and three measures of IS profitability were tested and supported (Ein-Dor et al., 1981). Also, system use was affected by the medium's usefulness (usefulness was defined as the extent to which an IS is friendly) which was affected by perceptions of the ease of use (Karahanna & Straub, 1999). Empirical evidence that system usage and user satisfaction were linked and provided evidence that user satisfaction was related to greater system usage (Baroudi et al., 1986); however, the study did not identify the direction of this relationship. The relationship between user satisfaction and system usage was examined by using a sample of Egyptian banks and found a positive correlation between the two concepts (Elnady & Elkordy, 1999) and a significant relationship between intention to use and user satisfaction in a KMS context was also found (Halawi et al., 2007).

While some studies identified a positive relationship between usage and user satisfaction, several studies did not find such a relationship (e.g., Schewe, 1976; Cheney & Dickson, 1990; Srinivasan, 1974). For example, use was not related to user satisfaction in a mandatory context (Seddon & Kiew, 1996). Nevertheless, a significant relationship between use and user satisfaction in an e-learning context was found (Chiu et al., 2007). Also, in a study of a medical IS in which use was mandatory, use was significantly related with user satisfaction (Iivari, 2005). Therefore, this discussion leads to the following hypothesis which tests the relationship between system use and user satisfaction:

H4: There is a positive relationship between system use and user satisfaction

- **Relationship between system use and individual impacts**

Empirical studies provided moderate support for the relationship between system use and individual impacts. DeLone and McLean (2003) identified seven empirical studies which tested the association between system use and individual impact and the association was found to be significant in each. System use was typically voluntary and was measured as frequency of use, time of use, number of accesses, usage pattern ...etc. Individual impacts were measured by job performance and decision-making performance (Goodhue, 1995; Igarria, 1997; Igarria & Tan, 1997; Teng, 1996; Torkzadeh, 1999; Weill, 1999; Young, 1998).

However, a significant relationship between intention to use and net benefits as measured by improvements in job performance was found (Halawi et al., 2007). The impact of initial usage on individual productivity may also differ from that of continued usage (Chin & Marcolin, 2001). On the other hand, some studies suggest otherwise. McGill et al. (2003) found that intended use was not significantly related to individual impact. Other studies found no relationship between use and individual impacts (e.g., Wu & Wang, 2006; Iivari, 2005) and between frequency of use and job satisfaction in three different Asian firms (Ang & Soh, 1997). The previous discussion leads to the following hypothesis:

H5: There is a positive relationship between system use and individual impacts

On the other hand, system use has always been criticised for being suitable only for voluntary use (Zmud, 1979). The measurement of use issue is sometimes complicated by whether IS use is voluntary or involuntary; if the IS use is voluntary, it would be better to depend on use as a measure of IS success (Seddon, 1997). Some researchers have argued that use is irrelevant when a system is mandatory and it is better to use

system usefulness instead. Doll and Torkzadeh (1998) and DeLone and McLean (1992) argued that system use is an appropriate measure of success in most cases and is a key variable in understanding IS success. As for this study, system usage was usually compulsory at bank employees' level. However, at the Egyptian bank managers' level, system usage is voluntary; as one of the banks IS professionals stated in one of the interviews, *"Of course, you cannot force any manager to use the system. We provide training for them; however, if they do not want to use the system because they do not like it or they do not know how to use it, you cannot force them to use it"*.

However, intention to use is a measure of the likelihood a person will employ or use the application or system. It is a predictive variable for system use. However, only when system use is difficult to assess can measuring intention to use is worthwhile (Davis, 1993; Zhuang et al., 2000). For these reasons, because system use in this study was not mandatory and because of the attractiveness and possibility for measuring system use, the decision was made to use actual system use rather than intention to use or system usefulness and they were dropped from the proposed conceptual model.

3.6.5 User Satisfaction

User satisfaction is the most general perceptual measure of IS success (Seddon, 1997). The gain in popularity of user satisfaction as a measure of IS success (Davis et al., 1989; Ives & Olson, 1984; Larcker & Lessig, 1980; Palvia & Palvia, 1999) may be attributed to the absence of a comprehensive agreed-upon instrument and the intuitive connection to IS success (Martinsons & Chong, 1999).

User satisfaction is the measure of the successful interaction between the information itself and its users (Glorfeld, 1994). DeLone and McLean (1992) argued that user satisfaction has been widely used for the following reasons: *"First, 'satisfaction' has a high degree of face validity. It is hard to deny the success of a system, which its users*

say they like. Second, the development of the Bailey and Pearson instrument and its derivatives has provided a reliable tool for measuring satisfaction and for making comparisons among studies. The third reason for the appeal of satisfaction as a success measure is that most of the other measures are so poor; that they are either conceptually weak or empirically difficult to obtain.”(p. 69).

- **Relationship between user satisfaction and other variables (including individual impacts)**

Researchers have studied user satisfaction and how it is related to other variables. For example, the relationship between end users’ satisfaction and organisational maturity of an IS was investigated and found a weak correlation relationship between variables in the maturity stage and the level of user satisfaction (Mahmood & Becker, 1985/1986).

The relationship between user satisfactions, management style and user participation in Taiwan was examined and found that user participation is not always significantly correlated with user satisfaction (Liu & Wang, 1997). Four variables: process user dissatisfaction, outcome user dissatisfaction, process user satisfaction and outcome user satisfaction were proposed. System usage and satisfaction were affected separately and jointly by these four variables (Woodroof & Kasper, 1998).

Regarding the relationship between user satisfaction and individual impacts, there are relatively few studies, especially when the focus was on the effect on individual job performance. However, these few empirical results have shown a strong association between user satisfaction and individual impacts (Iivari, 2005; Seddon & Kiew, 1994; Amoli & Farhoomand, 1996; Gatian, 1994). For example, user satisfaction has been found to have a positive impact on user’s job (Yoon & Guimaraes, 1995; Guimaraes & Igbaria, 1997; Doll & Torkzadeh, 1999), to improve performance (McGill et al. 2003),

to increase productivity and effectiveness (Igbaria & Tan, 1997; Rai et al., 2002; McGill & Klobas, 2005; Halawi et al., 2007) and to enhance job satisfaction (Ang & Soh, 1997).

However, user satisfaction was only weakly related to decision-making performance (Yuthas & Young, 1998). Nevertheless, a survey of Dutch managers (Gelderman, 1998) found the association was not significant, where the associations between system use and organisational revenues and profitability were not statistically significant. Similar results were found when Law and Ngai (2007) evaluated the relationship between user satisfaction and organisational performance of an ERP system. Thus, the relationship between user satisfaction and individual impact will be investigated by the following hypothesis:

H12: There is a positive relationship between user satisfaction and individual Impacts

3.6.6 Individual Impact

Individual impact refers to the effect of information on the behaviour of the receiver of the information (DeLone & McLean, 1992). The latter indicated that performance of users of an IS and individual impact were closely related and improving performance indicated that the IS had a positive impact.

- **Relationships between individual impacts and other variables**

Some studies investigated the relationship between individual impacts and different variables. For example, office automation had led to positive effects on the workplace (Millman & Hartwick, 1987). Similarly, the majority of people employed in automated offices felt that ISs enriched their work (Bikson et al., 1985). In addition, skill variety, computer anxiety and relative advantage of ISs were important in identifying users with higher and lower abilities (Marcolin et al., 1997). User satisfaction was also a

significant factor affecting system usage and that user satisfaction had the strongest direct effect on individual impact. Use and user satisfaction were direct antecedents of individual impact and this impact on individual performance should eventually have some organisational impact (Igbaria & Tan, 1997).

Although it may be more desirable to measure system benefits in terms of numeric costs (e.g., cost savings, expanded markets, incremental additional sales and time savings), such measures are often not possible because of intangible system impacts and intervening environmental variables which may influence the numbers (McGill & Hobbs, 2003). Therefore there has been little consensus on how net benefits should be measured objectively and they are usually measured by the perceptions of those who use the IS. Therefore, 'perceived system benefits' or 'perceived usefulness' has been adopted as an important surrogate of IS success (Wixom & Watson, 2001). The current study therefore is conservative about the 'net benefits' construct. This research thus concentrated on measuring the impact of ISs on the 'Individual impact' only, leaving the organisational impact and the impact on the social and other levels to future research.

However, the net benefit measure in the DeLone and McLean (2003) model is conceptually too broad to define. As DeLone and McLean (2004) suggested, *'the new net benefit construct immediately raises three issues that must be addressed: What qualifies as a benefit? For whom? And at what level of analysis?'* (p.32). Firstly, net benefits was used instead of 'individual impact' and 'organisational impact' in the original (1992) model, as the original term 'impacts' may be positive or negative, thus leading to a possible confusion as to whether the results are good or bad. Also, the inclusion of 'net' in 'net benefits' is important because no outcome is wholly positive without any negative consequences.

The second issue of concern is benefits for whom? the designer, the sponsor, the user or others? Different stakeholders may have different opinions as to what constitutes a benefit to them (Seddon et al., 1999). The DeLone and McLean model did not define this context so the focus of any proposed study must be defined (DeLone & McLean, 2003). Additionally, the level of analysis must be addressed (Seddon et al., 1999; Chan, 2000). Are the benefits to be measured from the individuals' perspectives, their employees or that of the industry or of the nation? Thus, it is difficult to define these 'net benefits' without first defining the context or frame of reference. Based on these considerations and to make the present study manageable, as it may also be difficult to separate the effect of IS from other factors on the organisational level, the present study focuses on the individual level only, leaving the organisational, social and other levels to future research.

Another issue of concern is of the feedback loops (troubleshooting). Seddon and Shang (2002) stated the concept of the cycles of system improvement, which means that firms implement IS, use IS, evaluate the benefits of use and adjust the systems and/or process to improve their performance for the next cycle of IS use. If the IS or service is to be continued, it is assumed that the impacts are positive, thus influencing the reinforcing of subsequent use and user satisfaction. These feedback loops are still valid, however, even if the impacts are negative. The lack of positive impacts is likely to lead to decreased use and possible discontinuance of the system or of the IS department itself. These ideas depict the cyclical nature of IS success, which was not clear enough in the DeLone and McLean models. This suggests the necessity to emphasise this cyclical nature when applying the proposed research model.

- **Relationship between individual impacts and system use**

The relationship between individual impacts and system use has received moderate support. Many studies have found a relationship between behavioural intention and system use (Subramanian, 1994; Hong et al., 2001/2002; Malhotra & Galletta, 2005; Wixom & Todd, 2005; Klein, 2007). Other studies have found strong relationships between perceived usefulness and self-reported use (e.g., Igbaria et al., 1997; Wu & Wang, 2006). However, perceived usefulness was not related to intention to use nor to self-reported use (Lucas & Spitler, 1999). On the other hand, mixed results was found as Compeau et al., (1999) identified positive and significant relationship between use and net benefits as performance-related outcomes but found small negative significant effect on personal-related outcomes.

- **Relationship between individual impacts and user satisfaction**

There is strong support for the relationship between individual impacts and user satisfaction. Many studies have found a positive and significant relationship between perceived usefulness and user satisfaction (e.g., Seddon & Kiew, 1996; Rai et al. 2002; Hsieh & Wang, 2007). Three other studies found that the impact an expert system has on a user's job directly affects user satisfaction (Yoon et al., 1995; Guimaraes et al., 1996; Wu & Wang, 2006). For example, a significant association between perceived productivity and user satisfaction of computer-mediated communication systems was found in Saudi Arabia (Abdul-Gader, 1997) and a relationship between decision-making satisfaction and overall user satisfaction in an e-commerce websites' context was also found (Bharati & Chaudhury, 2006).

Therefore, the feedback loops go from the individual to system use and user satisfaction. The association between system use, user satisfaction and individual

impacts will be explored on more than one level of individual impact in the current study: the relationship between system use and user satisfaction on individual impacts on task productivity, task innovation, internal/external customer satisfaction and management control.

User-related (demographic) and context-related (situational) variables

The present study has attempted to develop a conceptual model which included constructs related to IS success, the organisational context and the users. As was mentioned early in this chapter in pages 61 to 64, the focus of the current study will be on success measurements, from the socio-technical viewpoint, which should capture both technological and human elements. In the existing IS literature, several factors were found to affect IS success in general such as user involvement, management support, end user expectation and attitude, politics, task structure, user expertise, user influence, user conflict, gender, end user training and personal characteristics.

User-related (demographic) and context-related (situational) characteristics may influence one's perception of ISs (Lucas, 1982) and the way one processes them. User and situational-related variables (constructs) have an important role in the eventual success of IS (Guimaraes & Igbaria, 1997; Allen et al., 2002). The following Table 3.6 presents a summary of some of the demographic and situational variables and their relationships with some determinants of IS success:

Table 3.6 Summary of relationships between some demographic and situational variables and variables of ISs success (Elnady & Elkordy, 1997)

Independent variable	Study	Dependent variable	Results
Age	Igbaria (1993) Igbaria (1993) Igbaria (1992) Leaderer & Mawhinney (1990) Culnan (1983) Lucas (1975) Schewe (1976) Schewe (1976) Taylor (1975)	User attitude System use System use System use System use System use User attitude Interactive use Information quantity	No direct influence Positive influence Negative relationship No relationship Negative relationship Negative & positive Positive relationship Positive relationship Positive relationship
Tenure in job	Lucas (1975) O'Reilly (1982) Schewe (1976) Schewe (1976)	System use Use of info. Sources User attitude Interactive use	Negative relationship Negative and positive Negative relationship Positive relationship
Educational level	Igbaria (1993) Igbaria (1993) Igbaria (1992) Mawhinney & Leaderer (1990) Culnan (1983) Lucas (1975) O'Reilly (1982) Schewe (1976) Schewe (1976) Vasarhelyi (1977)	User attitude System use System use System use System use User attitude Use of info. Sources User attitude System use User performance	No influence Positive influence Positive relationship No relationship Positive relationship Negative relationship Negative and positive No relationship No relationship Positive relationship
Organisational level	Mawhinney & Leaderer (1990) Culnan (1983) Eason (1976) Lucas (1975) Specht (1986)	System use System use System use Indirect use Flexibility	No relationship Negative relationship Negative relationship Positive relationship Positive relationship
User training	Igbaria et al (1995) Igbaria (1993) Igbaria (1993) Amoroso & Cheney (1991) Cronan & Douglas (1990) Nelson & Cheney (1987) Schewe (1976) Schewe (1976)	System use User attitude System use System use User attitude Productivity User attitude System use	Positive influence No influence Positive influence No relationship No relationship Positive relationship Positive relationship No relationship
length of system use	Gatian (1994) Sanders & Courtney (1985) Vasarhelyi (1977)	User satisfaction User satisfaction System acceptance	Positive relationship Positive relationship Positive relationship
User involvement	Amoako-Gyampah & White (1993) Montazemi (1988) Schewe (1976) Schewe (1976) Noshei (1984) Noshei (1984)	User satisfaction User satisfaction User attitude System use Information quality Information use	Positive relationship Positive relationship No relationship No relationship Positive relationship Positive relationship

Individuals with distinct characteristics and backgrounds are expected to have unique ways of interacting with ISs and, consequently, to have different attitudes and behaviour towards them. Zmud (1979) identified three groups of user-related variables investigated in IS research:

(1) Cognitive style (e.g. complex/simplex, intuitive/ analytic, heuristic/systematic)

(2) Personality type (e.g. tolerance of ambiguity, field dependent/independent)

(3) Demographic factors (e.g. age, gender, profession, education, user experience, attitude towards IS organisational position).

Zmud (1979) concluded that, compared with the other two groups, fewer studies (e.g. Palvia & Palvia, 1999; Petter et al., 2008; Taylor, 2004) investigating demographic variables have been conducted.

Thus, this study seeks to fill the possible human element gap in the DeLone and McLean model by adding some demographic and situational variables which could have an effect on system usage and satisfaction with the system and finally could lead to favourable performance of the end users in their work place. However, because of time constraints and to keep the present study manageable, this study has focused only on some of the demographic and situational variables and added some personal variables (Age, Organizational Level, Tenure in the job, Education and Length of system use) and from the context-related (situational) variables, User training, User involvement and Top management support were added to the adopted DeLone and McLean (2003) updated IS success model. The selection of these variables depended mainly on the existence of literature review that supports the relationships between those variables and system use and user satisfaction.

Therefore, the present study investigated the relationships of users' age, tenure of the job, organisational level, education, training, length of system use, user involvement and top management support with system use and user satisfaction and their impact on individual performance as follows.

3.6.6 Age

A person's willingness to accept a new technology or a change may differ according to his / her age (Davis at al., 1989). Age was found to be associated positively with information use and negatively with information processing speed (Taylor, 1975).

- **Relationship between age and system use**

Contradictory findings (negative and positive) were given regarding the relationship between age and system use (Lucas, 1975). A direct and positive effect of age on microcomputer usage was also found (Igbaria, 1993). Age was found to have no correlation with the managers' use of microcomputers (Mawhinney & Leaderer, 1990). Age was found to associate negatively with interactive and indirect use of systems and those who did not use the systems were older than those who did (Culnan, 1983). In addition, by using a sample of Taiwanese managers, Igbaria (1992) found age to correlate negatively with microcomputer use time. However, a significant negative relationship between age and system use (Elnady & Elkordy, 1997). The relationship of age with system success has been in debate, therefore the inclusion of the age variable to the proposed model may result in a clearer understanding of the nature of the relationship between age and system use and user satisfaction and may finally lead to improved individual performance. The previous discussion leads to the following hypothesis:

H6a: There is a negative relationship between user's age and system use

- **Relationship between age and user satisfaction**

Also, older users would express less IS satisfaction (O'Reilly, 1982). However, according to the Igbaria (1992) and Jackson et al. (1997) studies, older users perceive systems as more useful. The relationship between age and satisfaction with the system was related to the differences in their level of change acceptance according to their ages (Dickson & Simmons, 1970). Since younger users generally display a more positive attitude towards the IS, they are more ready to accept the change (Nelson, 1990). However, a positive association between managers' ages and their attitudes towards the system's influence on productivity and their system use was found (Schewe, 1976). Also a significant positive relationship between age and users' overall satisfaction was found (Elnady & Elkordy, 1997). That leads to the following hypothesis:

H6b: There is a negative relationship between user's age and user satisfaction

3.6.7 Organisational level

The organisational level of the user's job determines his/her responsibilities and decisions and, consequently, his/her informational needs (Lucas, 1982). Organisational level is an important variable in IS research (e.g. Orlikowski & Robey, 1991; Ang & Pavri, 1994). Organisational level is normally classified as top, middle and lower management, professional and administrative support. People in these different positions may have different attitudes about the IS prior to usage, not based on individual differences but because of different expectations about the role of IS in their respective positions. Thus, usage and satisfaction with IS may vary depending upon one's position in the organisation.

In general, some studies showed no correlation between organisational level and user satisfaction (Igbaria, 1992, 1993). Another study reported a satisfied low-level

employee as opposed to very dissatisfied managers (Jackson et al., 1997) and perceived usefulness was suggested to differ across different organisational levels (Gallagher, 1974).

- **Relationship between organisational level and system use**

A positive correlation between system use and the user's organisational level was found (Lucas, 1975, 1978). Managers' level in the organisation was found to have no correlation to microcomputer usage (Mawhinney & Leaderer, 1990). However, the relationship between the organisational level and system use was found to be negative (Culnan, 1983; Eason, 1976; Elnady & Elkordy, 1997). The relationship between the user's organisational level and system use is explored by using the following hypothesis:

H7a: There is a positive relationship between organisational level and system use

- **Relationship between organisational level and user satisfaction**

Satisfaction with and use of a system may vary at different managerial levels. Users at high managerial levels ranked system output flexibility above its quality while users at the lower level of management rated output quality higher than its flexibility (Specht, 1986). Further, user attitude towards system use was found to correlate positively with his/her organisational level (Lucas, 1978) and organisational level had a positive association with the overall satisfaction with the IS (Elnady & Elkordy, 1997).

At high organisational levels, Senn (1982) explained that the managers do not usually interact directly with ISs and therefore evaluate such systems on an objective basis such as accuracy and speed of doing work and cost reductions. So they seem to be more satisfied with the systems. On the other hand, at the medium organisational level, the

managers interact directly with such systems and therefore evaluate them on a subjective basis, such as their impacts on the traditions within work groups and on style of relationships within the organisation. So they seem to be less satisfied with the systems. This leads to the following hypothesis:

H7b: There is a positive relationship between the organisational level and user satisfaction

3.7.3 Length in job

User attitude and behaviour towards IS are expected to vary with the user's work experience, measured as tenure in the industry, organisation or job.

- **Relationships between length in job and other variables**

Mixed findings were found in many studies, for example users with longer length within the industry, organisation and job were found to display a more positive attitude towards systems (Schewe, 1976; Lucas, 1978). Also, length in job correlated positively with system use (Schewe, 1976). Work experience was found to correlate negatively with indirect and interactive use of database systems (Culnan, 1983) and length of job correlated negatively with system use (Lucas, 1975b). However, the relationship between length in job and system use was found to vary according to the investigated information source (e.g. written reports, oral reports) (O'Reilly, 1982). Elnady and Elkordy (1997) found it to have an insignificant relationship with overall user satisfaction and system use as well. Therefore, the following two hypotheses are used to explore the relationships between tenure in the job and system use and user satisfaction:

H8a: There is a positive relationship between tenure in the job and system use

H8b: There is a positive relationship between tenure in the job and user satisfaction

3.6.8 Education

Higher levels of formal education may increase an individual's ability to manage work problems and to use more information sources (O'Reilly, 1982) which, consequently, contributes to development of the attitude towards the use of ISs. Jackson et al. (1997) found higher perceived usefulness among users with more formal education.

- **Relationship between education and system use**

Education was found to have a direct influence on microcomputer use (Igbaria, 1993). In another study, using a sample from Taiwan, education was found to correlate positively with the number of microcomputer application packages used (Igbaria, 1992). Education was also found to correlate positively with interactive and indirect use of systems (Culnan, 1983). A positive relationship between education and decision support systems' (DSS) impact on work performance was found (Vasarhelyi, 1977) and with verbal information sources and negatively with written sources (O'Reilly, 1982). However, no relationship between education and microcomputer usage was found (Mawhinney & Leaderer, 1990) and other studies found that education correlated negatively with system use (Lucas, 1975; Schewe, 1976; Elnady & Elkordy, 1997). Therefore, the relationship between user's education and system use is explored by the following hypothesis:

H9a: There is a positive relationship between user's educational level and system use

- **Relationship between education and user satisfaction**

Education was found to have no effect on users' attitudes toward microcomputers (Igbaria, 1993). Education level was found to correlate negatively to user satisfaction (Lucas, 1978). However, education level had no correlation with attitude towards the system's impact on organisation performance and work conditions (Schewe, 1976;

Elnady & Elkordy, 1997). However, from the researcher's point of view, formal level of education could have some effect on user IS satisfaction level. Therefore, the relationship between the level of education and user satisfaction is proposed by the following hypothesis:

H9b: There is a positive relationship between user's educational level and user satisfaction

3.6.9 Length of system use

Length of system use refers to the time the user spent in using the exact IS at work. Lengthy use of an IS may strengthen the user's belief in its usefulness, which consequently may increase his/her satisfaction with the system, as more years of computer experience lead to greater use of computers and to greater user satisfaction as well (O'Reilly, 1982). Users with better computer skills were found to perceive systems as more useful (Igbaria, 1992; Jackson et al., 1997).

- **Relationship between length of system use and system use**

Length of system use was found to associate positively with the user's willingness to use the system (Yaverbaum, 1988). However, no relationship between duration of system use and user satisfaction was found in other studies (Montazemi, 1988; Elnady & Elkordy, 1997). And this leads to the following hypothesis:

H10a: There is a positive relationship between duration of system use and system use

- **Relationship between length of system use and user satisfaction**

Length of system use was found to associate positively with user satisfaction (Sanders & Courtney, 1985; Gatian, 1994) and with system acceptance (Vasarhelyi, 1977). On the other hand, Elnady and Elkordy (1997) found an insignificant relationship with user's overall satisfaction. This leads to the following hypothesis:

H10b: There is a positive relationship between length of system use and user satisfaction

3.6.10 Training

User training, particularly in an end-user computing environment, is viewed as an important influence upon the effectiveness and success of ISs (Amoroso & Cheney, 1991). Users are more likely to feel that they control and own the system and to feel satisfied with an IS if they have been trained to use it properly (Cronan & Douglas, 1990). User training in ISs is defined as the extent to which an individual has been trained about ISs through college courses, vendor training, in-house training, and self-study (Igbaria et al., 1995). It reflects such prior training about ISs in general and not training about the specific IS being developed. User training is posited to facilitate user participation as IS development teams would seek greater participation from users if they have received IS training in the past and such users may themselves be more motivated to participate in IS projects (Guimaraes et al. 2003).

The lack of user training and failure to understand how an organisation's applications change business processes frequently appears to be responsible for IS problems and implementation failures (Al-Mashari, 2000; Davenport, 1998, 2003; Estevez, 2000; 2001; Somers & Nelson, 2001, 2001; Sumner, 1999). Bingi et al. (1999) believed that employees' training is often a hidden cost during project implementation. However, without the proper training, there might be resistance to the IS in different ways. If the system is voluntary, users will choose to avoid it; if the system is mandatory, resistance may take the form of increased error rates, disruptions, turnover and even sabotage (Doll, 1985).

- **Relationship between training and system use**

In a sample from Taiwan, training was found to correlate positively with microcomputer usage (Igbaria, 1992). In another studies, a positive influence of training on system usage was found (Igbaria et al., 1995; Nelson & Cheney, 1987). However, no relationship between training and system use was found in other studies (Amoroso & Cheney, 1991; Schewe, 1976; Elnady & Elkordy, 1997). So the following hypothesis is tested:

H11a: There is a positive relationship between training level and system use

- **Relationship between training and user satisfaction**

Better understanding of the system in use increases user satisfaction (e.g., Montazemi, 1988). Training was found to increase user satisfaction with, or attitude towards, the system (e.g., Cronan & Douglas, 1990; Amoroso & Cheney, 1991; Sanders & Courtney, 1985; Schewe, 1976). However, no relationship of user satisfaction and user attitude towards the computer system with his/her training or computer competency was found (Nelson & Cheney, 1987; Elnady & Elkordy, 1997). On the other hand, it was found that by having the training, user satisfaction increased and work productivity increased by 24% (Cronan & Douglas, 1990). So the following hypothesis is proposed:

H11b: There is a positive relationship between training level and user satisfaction

3.6.11 User involvement

User involvement is the participation in the development by a member or members of the objectives group in the system. Historically, it has been accepted that user involvement is a critical factor for successful IS development/implementation (Ishman, 1998). The importance of user involvement in the IS development and implementation

is related with the positive individual and organisational benefits (Lawrence & Law, 1993), the fact of leading in getting reports and successful systems (Robey et al., 1989), allows to get better understanding of the requirements and needs (Chow & King, 2001), the user has a positive reaction and acceptance of the system (Lawrence & Law, 1993) and thinking that the system is useful (Franz & Robey, 1986).

Sabherwal et al. (2006) defined user participation in the development of the specific IS as the assignments, tasks and behaviours that users or their representatives perform during the IS development project. User involvement also refers to a subjective psychological state of the user, in which he believes in a system which has two characteristics: the importance and personal relevance that a user attaches either to a given system or to management ISs in general (Barki & Hartwick, 1989). However, the following definition was adopted in this study: user participation or user involvement is the behaviour and activities of users or their representatives during the system development process (Barki & Hartwick, 1994).

User involvement is considered an important factor to ensure high quality systems as it increases system success through increasing system usage and user satisfaction with the system (Baroudi et al., 1986). Involvement was suggested to mediate the influence of user participation in systems' success (Kappelman & McLean, 1991). User participation is reported to increase the chances of user acceptance and successful implementation because it helps tailor the system to meet users' perceptions (Franz & Robey, 1986; Watson et al., 1997). The role of users in the implementation process was considered as one of the most important explanations for the success and failure of ISs. User involvement in the design and operation of ISs has several positive results. First, if users are heavily involved in system design, they have more opportunities to mould the system according to their priorities and business requirements. Second, they are more

likely to react positively to the system because they have been active participants in the change process. Their participation in implementation fosters favourable attitudes towards the system and the change it engenders (Lucas, 1974).

The present study classified user involvement as a context-related (situational) variable because it is considered as a description of the user situation with the organisation, as the current study focuses on the perception of the user's involvement/ participation in the stage before, during and after actual system use.

- **Relationship between user involvement and system use**

Noshei (1984), in one of the few studies conducted in Egypt, found user involvement to influenced system use. However, no relationship was found between the two (Schewe, 1976; Elnady & Elkordy, 1997). Additionally, Ives and Olson (1984) found that out of the 13 studies investigating the relationship of user satisfaction to user involvement, only eight showed a positive correlation (e.g. Kim & Lee, 1986). Similarly, four out of nine studies investigating the relationship between user involvement and system usage reported significant relationships (e.g. King & Rodriguez, 1978). The following hypothesis is used to investigate the relationship between user involvement and system use:

H12a: There is a positive relationship between user involvement and system use

- **Relationship between user involvement and user satisfaction**

In addition, user involvement was found to be correlated positively with user satisfaction (e.g., Amoako- Gyampah & White, 1993; Elnady & Elkordy, 1997; Montazemi, 1988; Noshei, 1984; Swanson, 1974). However, no relationship between

user involvement and his/her attitude towards the system was found (Schewe, 1976). So the study proposes the following hypothesis:

H12b: There is a positive relationship between user involvement and user satisfaction

3.6.12 Top management support

Top management support (TMS) is one of the most often cited critical success factors (CSFs) in the IS literature (Al-Mashari, 2000; Adler & Ferdows, 1990; Applegate & Elam, 1992; Apigian et al., 2004; Benjamin et al., 1985; Brown & Vessey, 1999; Currie & Glover, 1999; Davenport, 2000; Estevez, 2000; Earl, 1996; Garrity, 1963; Holland, 1999; Lyles, 1979; Nah, 2001; Sarker & Lee, 2000; Smyth, 2001; Stewart, 2000; Sumner, 2000; Watson, 1990). Yet despite such acclaim, there is a dearth of empirical study exploring this theme within the IS literature.

Top management support of ISs refers to the degree to which top management understands the importance of the IS function and the extent to which it is involved in IS activities. Support from top management facilitates many of the operational and strategic IT management activities. These include negotiation, IS planning, project management and similar tasks (Weill & Vitale, 2002).

Top management support for ISs is expected to directly affect IS success (Sabherwal et al., 2006; Weill, 1992). There is considerable evidence of its effect in previous literature (e.g., Doll, 1985; Jarvenpaa & Ives, 1991). Management support for ISs in general promotes the quality of the specific system by facilitating the allocation of needed resources during and after the IS project (Bajwa et al., 1998; Thong et al., 1996). Symbolic actions of support by senior managers also contribute to successful IS implementation (Sharma & Yetton, 2003).

The absence of top management support is a critical barrier to IS use and the lack of some organisations' productivity has been attributed to it (Brynjolfsson, 1993; Choe, 1996; Wilson & McDonald, 1996). Its importance in IS has been theorised in the literature since the early 1960s (Brady, 1967; Blumenthel, 1969) and became more widespread throughout the 1970s (Ein-Dor & Segev, 1978) and 1980s (Ginzberg, 1981; Keen, 1981; Lucas, 1981; Markus, 1983; Jarvenpaa & Ives, 1991). More recent literature evidences the continuing recognition of the importance of TMS in relation to the IS function (Hamilton, 1999; Rai et al., 1998; Sohal et al., 2001; Weill, 2002; Wilson & McDonald, 1996).

A majority of organisations which had major problems in the planning, development or usage of IS attributed them to failure to get top management support (Teo & Ang, 2001) and insufficient top management support was identified as one of the greatest impediments to IT success (Sohal et al., 2001).

IS management literature suggested that 'top management' embraces the twin roles of the chief executive officer (CEO) and the chief information officer (CIO). 'Support' is said to come about through executive (CEO/CIO) participation and involvement (Diebold, 1969; Dong, 2001; Jarvenpaa & Ives, 1991; Kanter, 1986; Thong et al., 1996). More generally, support is deemed to embrace long-term funding and resource commitments (Earl & Fenny, 1994; Kanter, 1986; Nath, 1989), developing project coalition groups and steering committees to meet new changes (Feeny et al., 1991; Ives and Olsen, 1981; Maruca et al., 2000; Rockart, 1979), sharing the vision with the organisation (Dong, 2001; Earl & Fenny, 1994; Enns et al., 1997; 2001; Nath, 1989), developing a strategy (Galliers, 1987; Leaderer & Mendelow, 1986; Tan, 1995), communicating the change vision (Dean, 1968; Stewart, 2000; Watson, 1990), encouraging positive attitudes towards change in the organisation (Ginzberg, 1981;

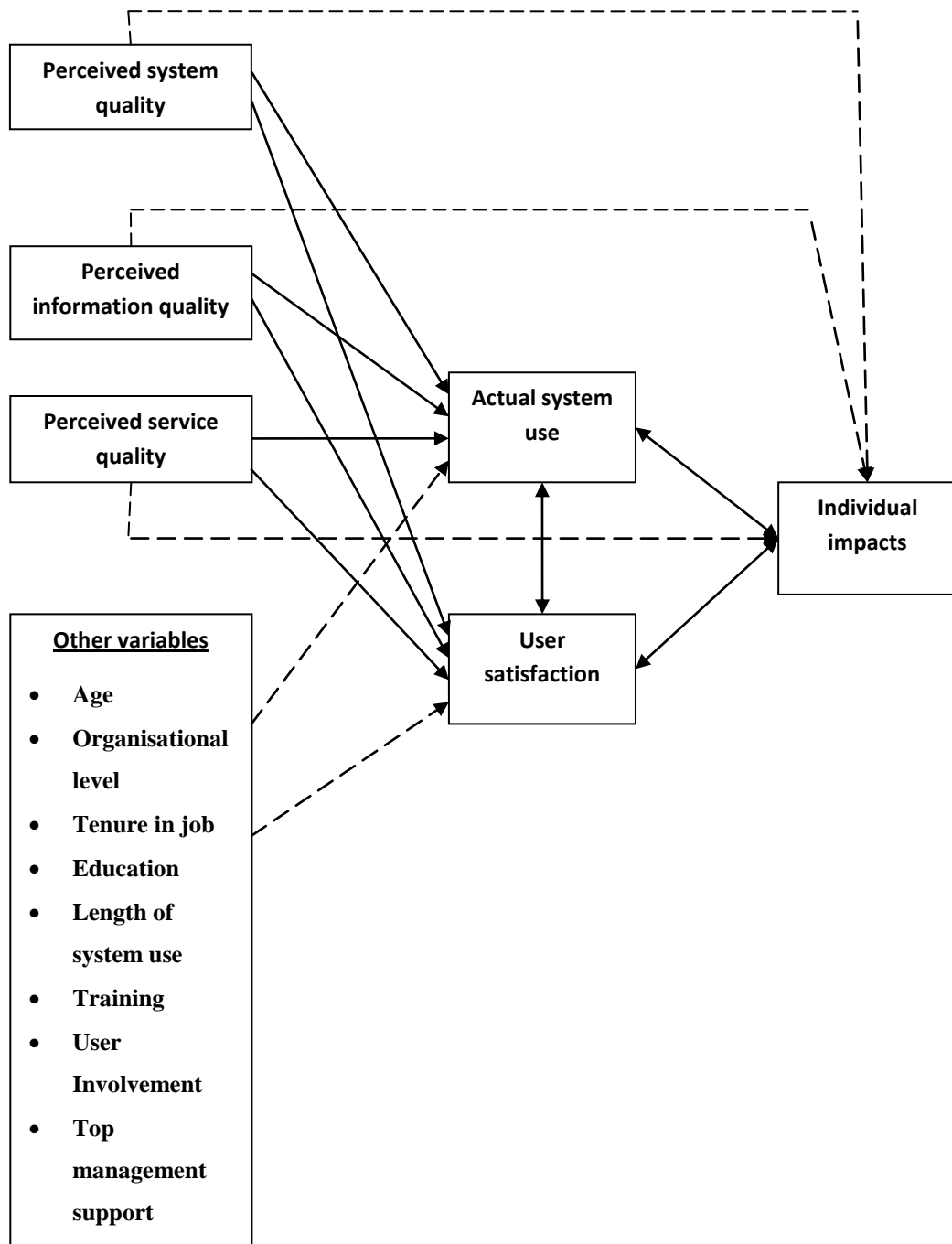
Thong et al., 1996) and, finally, ensuring new changes are accepted as part of the organisational culture. Therefore, The importance of the topic and the lack of an underlying framework for grounding empirical validation have provided the motivation for the inclusion of this variable in the proposed theoretical model of the present research. The relationships between top management support and system use, user satisfaction are explored by the following hypotheses:

H13a: There is a positive relationship between top management support and system use

H13b: There is a positive relationship between top management support and user satisfaction

Therefore, based on the previous literature review, the following Figure 3.5 presents the proposed model of this study:

Figure 3.5 Proposed research conceptual model



Original relationships 

Proposed relationships 

To conclude, in this chapter, the literature review included discussing the IS success and IS failure, previous work related to IS success and DeLone and McLean (1992/2003) models. Also, previous work related to banking industry and IS evaluation was presented. After each section, a conclusion on each section was presented. From this literature review, we may conclude that previous literature in general and in banking sector in particular applied whole or some parts of DeLone and McLean (1992/2003) IS success models and their relationships in different contexts and in different countries to try to examine IS success, however, these models needed to be more developed and extended to include other social/user variables. Since the updated model (2003) focused only on information quality, system quality and service quality and their impact on system usage, user satisfaction and net benefits, then it was clear that demographic and situational factors were missing from the IS success model.

The literature review in this chapter also included a more detailed discussion on the different variables and their relationships with system use, individual satisfaction and user work out-put plus the inclusion of some demographic and situational variables to the proposed research model in an attempt to fill the human element gap in DeLone and McLean IS success models.

In this theoretical proposed research model, quality has three major perceived quality dimensions: information, system and service. The demographic/situational variables singularly and jointly affect both actual system use and user satisfaction, In other words, the left-hand side of the model establishes the relationships among system quality, information quality, service quality, user-related (demographic) and context-related (situational) variables, system use and user satisfaction. This study also proposes new direct relationships or associations between system quality, information quality, service quality and individual impacts. The right-hand side of the model assumes linear

causality between system use, user satisfaction and individual impacts. The original relationships were originally part of the updated DeLone and McLean (2003) model, while the proposed relationships are the new proposed associations in the research model based on literature review.

3.7 Summary

This chapter began with a review of relevant literature from the field of IS success and BIS. This review presented an overview of IT/IS definitions and IS success, IS failure and a background of the DeLone and McLean model. Next, an overview of relevant research which have evaluated IS success and studies which investigated IS success in the banking industry were presented. In the second part of this chapter, DeLone and McLean's (1992/2003) taxonomy was used to organise discussion of IS success dimensions and presented the variables which were included in the proposed research model. The additional variables which were added to the model were also discussed. These new variables included some of user-related and context-related variables that might have an effect on the BIS success. The findings from this review of were used to develop the conceptual research model.

Chapter 4

Research Methodology

4.1 Introduction

This chapter discusses the research methodology for this study. It begins with a revision of the proposed conceptual model according to the results of the IS professionals interviews and an overview of the epistemological approach driving the study process. Overall, the chapter presents the research methodology in seven sections. The first describes the proposed conceptual model according to the results of the IS professionals interviews. The second describes the different types of research and the research design and research questions. The third describes how measurements used in this study were operationalised. The fourth describes the population and sample. The fifth discusses the data collection method. The sixth presents the translation and pilot study. This is followed by a general outline plan of data analysis.

Research can be defined as a systematic and organised effort to investigate a specific problem that needs a solution. It consists of a series of steps designed and followed with the goal of finding answers to issues of concern. It is the entire process by which people attempt to solve problems (Sekaran, 1984). The methodology the research follows must consist of defined logical rules and procedures if the finding of the research is to be accepted (Neuman, 1997).

The hallmarks of scientific research, according to Sekaran (1984), are sense of purpose, rigour, testability, replicability, accuracy, objectivity, generalisability and parsimony. Scientific research is dependent on the concepts of theory and empirical research. There are two approaches for research, the inductive and deductive. In the inductive approach theory comes after research, in the deductive approach, theory comes before research. The inductive approach is based on starting from the particular and moving to the

general; in the deductive approach, the researcher starts with a general view and moves to the particular (Neuman, 1997).

4.2 IS professionals' interviews

The proposed conceptual model (Figure 4.1) was based mainly on the adoption of the updated DeLone and McLean model (2003) and on the previous literature review, as it was purely conceptual. In order to test its practical relevance, the views of IS professionals in the banking sector were sought. Therefore, the semi-structured telephone interviews phase was conducted for this reason. The aim of this phase of the research was to assess the general structure and content of the model before testing individual hypotheses through a more extensive survey. In preparation for the survey research, exploratory interviews were held with five IS professionals in five Egyptian banks. The number of interviews was limited to only five because after the fifth, the interviewer had reached a saturation point as she perceived that no more benefits or more information would be gained from any more.

The goal of the telephone interviews was to investigate whether statements in the literature about the variables which may affect the success of BISs also held in practice. The interviews were semi-structured, based on a standard protocol and aimed at identifying any omissions or inaccuracies from the perceptions of experienced IS professionals in the banking sector. In this way, the theoretical underpinning of this research was supplemented by practitioners' views whereby a revised model reflecting both perspectives was developed and subsequently tested by the questionnaire survey.

4.2.1 Telephone- based interviews

Most surveys involve the use of questionnaires. There are three main ways in which these questionnaires are administered (Robson, 2002):

- Self-completion, in which respondents fill in the answers by themselves. The questionnaire is often sent out by post or by email, permitting large samples to be reached with relatively little extra effort. The geographical distribution of the sample can be wide.
- Face-to-face interview, in which an interviewer asks the questions in the presence of the respondent and also completes the questionnaire. In a face-to-face situation, travel time can add very substantially to the time and cost involved. In addition, to make face-to-face interviews feasible, in resource terms, it is necessary to limit the study to a particular area (Robson, 2002). However, face-to-face interviews have some advantages, such as high response rate, correction of obvious misunderstandings, fast research option and possible use of probes.
- Telephone interview, in which the interviewer contacts respondents by phone, asks the questions and records the responses and interviews, involves an interviewer for the whole time. Telephone-based surveys are becoming increasingly common (Robson, 2002) and reliance on telephone interviewing has increased dramatically in the last few decades, especially in the areas of market, political and public opinion research (Ruane, 2005).

Telephone interviews have many advantages, the major one being the lower cost in terms of time, effort and money. The data collection period is shorter in telephone interviews and it is thus feasible to carry out a substantial number per interviewer on each working day, though some repeat calls will be needed (Robson, 2002). The geographical distribution of the sample can be wide in the telephone interviews and the time and resources can be reduced as well. Like the face-to-face interview, they can produce high response rate, fast research option, correction of obvious misunderstandings and possible use of probes.

However, this way has some disadvantages as well, e.g. another follow-up call might have to be made to cover some aspects not fully covered during the first telephone interview. Rapport may be more difficult to achieve and the lack of visual cues may cause problems in interpretation. Finally, phone answering machines and busy lifestyles may force interviewers to make many call-backs (Ruane, 2005).

As for this study, one of the reasons for choosing telephone interviews was due to lack of resources such as time and money constraints, as it was not possible to conduct direct or face-to-face interviews with the respondents. Therefore, and for their advantages, the telephone interviews were preferred as a fast and cheap alternative to direct interviews in this study. The data collected from the respondents through the interviews were mainly qualitative. The main focus of this phase of research was on the respondents' opinions and views regarding the different themes and subjects covered in the interviews.

4.2.2 Semi-structured interviews

This type of interview is widely used in flexible designs, either as a sole method or in combination with others. Interviewers have their shopping list of topics and want to get responses to them, but they have considerable freedom in the sequencing of questions, in the wording and in the amount of time and attention given to different topics. The interview schedule can be simpler than the one for the structured interview. It is likely to include the following (Robson, 2002):

- Introductory comments.
- List of topic headings and possibly key questions to ask under these headings.
- Set of associated prompts.
- Closing comments.

It is common to incorporate some more highly structured sequences. The interviewer will have an initial topic but will then be to some extent guided by the interviewee's responses as to the succeeding sequences of topics. Notes should be made during the interviews, even if it is also being taped (Robson, 2002).

4.2.3 The process of semi-structured telephone interviews

In the current study, semi-structured interviews were conducted and recorded after getting the interviewee's consent for taping them and this had the advantage of enabling the interviewer to pay more attention to the discussions, rather than concentrating on note taking. The interviewees were experienced IS professionals (IS managers or chief operating officers) of the following five Egyptian banks: Alexandria Bank, Egypt-Barclays Bank, Misr Bank, Cairo Bank and HSBC Bank.

The reason behind choosing IS managers and/or chief operating officers is that these managers are the main managers responsible for designing new ISs, implementing the systems and modifying the systems at the banks. Therefore, they are considered IS professionals in the banking sector. Some banks have IS managers and others have chief operating officers but the job descriptions for both, according to what they said before and during the interviews, were the same.

The reason behind choosing those five banks is that they were five of the main and most important banks in the Egyptian banking industry and they also involved different types of banks: Alexandria Bank and Barclays Bank are private banks, Misr Bank and Cairo Bank are public banks and HSBC Bank is a branch of a foreign bank. This diversity in banks and in IS managers enriched the interviews as different points of view and opinions were obtained regarding the themes covered.

Each interview took between 20 to 30 minutes to complete. The topics covered were based mainly on the proposed conceptual model presented in Figure 4.1. The interview

questions covered topics (themes) about all the variables included in this model, e.g. System quality, Information quality, Service quality, Top management support, Age, Education, Training, User involvement, Organisational level, Tenure in the job, Length of system use, System usage, User satisfaction and, finally, the relationship between all those variables. Therefore, the interviews made it possible to explore and move between different themes, which enriched the data. (See Appendix C: Questions for the IS practitioners of Egyptian banks).

During the interviews, the interviewees were not asked all the questions listed in Appendix C as they were only guiding questions to direct the interviewer to the topics needing to be covered. Nevertheless, these questions were asked according to each interviewee's responses. The more responses and details the interviewer received, the fewer questions and prompts were asked. The next section will discuss the analysis of these interviews in more detail and conclude with their implications for the proposed model.

4.2.4 Analysis of telephone interviews

According to Patton (1987), analysis is the process of bringing order to the data, organising what is there into patterns, categories and basic descriptive units. Interpretation involves attaching meaning and significance to the analysis, explaining descriptive patterns and looking for relationships and linkages among descriptive dimensions.

For this research, the initial step was to conduct an analysis 'within each interview' which involved detailed write-ups for each one. These write-ups were simply pure descriptions but they were central to the generation of insight, because they help researchers to cope early in the analysis process, given the volume of the data they will

face (Eisenhardt & Bourgeois, 1988). The advantage of this method is that it allows for the unique features of each interview to emerge before trying to generalise patterns.

The second stage of the analysis of the interviews involved ‘cross-interviews- analysis’, which presented findings across the five bank interviews. The main tactic here was to select pairs of interviews and then to list the similarities between each. When a pattern in one interview was matched in another, then the findings or results have a better grounding.

The telephone interviews covered more than one theme. The questions of the semi-structured interviews were derived from the updated DeLone and McLean (2003) IS success model and from the previous literature which was related to some demographic and situational variables.

From the answers obtained from the interviews, it could be concluded that all the independent variables (except two) were from the perspectives of BIS professionals significant in their relationship with system use and user satisfaction as follows.

- **System quality, Information quality and Service quality**

Four out of the five interviewees regarded system quality, information quality and service quality to be the three main variables which had the most positive effect on system usage and the user satisfaction variable as well. The fifth interviewee was working as chief operating officer in Alexandria Bank and he thought that the service quality provided by the IS department had no effect on system usage and/or user satisfaction.

- **Top Management Support**

Four out of five interviewees perceived top management support for the IS as a strategic variable which had a great positive effect on the usage of the system and user

satisfaction. One interviewee (IS practitioner, Misr Bank) thought that top management was not involved or interested in the technical aspects of the IS and that the top management usually leave these tasks to the employees in the IS department.

- **Age and Education**

All five interviewees agreed that both age and education levels were very important variables in affecting system usage and user satisfaction with the system. The interviewees thought there was a negative relationship between age and system usage and user satisfaction: the older the bank employees and managers were, the less motivation they had to use the system and consequently the less they would be satisfied with it.

The interviewees also thought that the older bank employees and managers were sometimes afraid of using the new ISs as they thought that the use of such systems might come at the expense of their long years of experience and replace them in the future. So it usually took lots of effort and time from the IS department employees to train bank employees and provide workshops and training sessions for bank employees (especially the older ones) in special seminars in an attempt to convince them to use the new or modified IS. Interviewee (1) stated, *“Well, of course, the age of the employee is important, you know, the elderly employees always resist the new systems and think that they’ll be replaced by these systems and they don’t think that these systems are here to help them”*.

However, one general manager in one of Misr bank’s branches stated, *“As you see I am in my early fifties. At the time when I graduated from university none of this type of knowledge was available. According to my experience, I used to make decisions according to rules and regulations. When I heard about IT/IS, I read a book about it*

and I did not feel that it could do much for me. I am willing to learn even at this age but when I find the proper way of doing that”.

Therefore, we may say that if the attitudes of the users are influenced by their background and by the national culture, the background and culture will influence their perception of the value of the IS. The interviewees also thought that education level had a great positive effect on system usage and user satisfaction.

The interviewees perceived that when the education level for bank employees was high (college and more), the more they were motivated to use the system and, consequently, the more satisfied they would be with it. Handling and using the ISs in general and computer- based ISs in particular were related primarily with a high level of technology, and this was related with high levels of education.

- **Training level**

Training was perceived as one of the very important variables which had a great effect on the system usage and / or users’ satisfaction with the system within the organisations.

The interviewees thought that training breaks bank employees’ resistance to the new technology and encouraged them to accept new ISs and consequently helped them to be more satisfied because their awareness of the new systems, their functions, their importance and their usefulness to their work was increased.

However, the interviewees thought that training would be more important when bank employees and managers were less educated and /or more elderly, as these two categories needed more training on how to use and benefit from the ISs. Interviewee (2) stated, *“We had a time that we had to train some senior bank managers while they did not know how to use the mouse of the computer. You can imagine how they will be able to use and accept new information systems and let these systems take over their places at the bank? So it is not an easy job to do”.*

Interviewee (3) stated, *“Some managers think that IT/IS in general is like a sledge hammer waiting to fall on their heads. Some managers think they know how to use it and don't. The IT staff trained them how to use this system. Sometimes the managers say it to us clearly that they don't understand why they need it, what it can do for them and they have no intention to use it”*.

- **User Involvement**

All of the interviewees agreed that user involvement was one of the important variables which had a big positive effect on the system usage and/ or user satisfaction with the system.

They thought that the feedback information they received from the IS users had a great effect on the process of redesigning, implementing and even modifying new systems. They also thought that the more the management would allow end users to participate or be involved in the design and implementation of the ISs, the more the bank employees would be encouraged to use the system and the more they would be satisfied with it. Because, then, the IS would meet employees' and managers' needs for information and meet their job requirements as well. They also agreed that user involvement would minimise the employees' resistance to new or modified systems, as the employees then would know that their opinions and views were taken into consideration before introducing the new and/or modified systems.

- **Organisational level and Tenure in job**

Organisational level and tenure in the job were perceived as having insignificant effect on system usage and on users' satisfaction with the systems as well.

The interviewees thought that the organisational level (Branch managers, Department manager and Division manager) had no effect on system usage or user satisfaction, as

each of the organisation levels had its own job requirements and specific needs of information. Therefore, the usage of the system and the satisfaction with the system depended mainly on fully meeting their job requirements and their information needs, not on the organisational level itself.

They also thought tenure in the job did not have any effect either on system usage and user satisfaction. However, they did not deny that the more years the employee spent in his/her job and the more he/she used the system, the more he/she might be satisfied with the system. Nevertheless, they thought that tenure in the job was rather related to the age of employees. The interviewees thought that the effect of age was more obvious than the effect of tenure in job on system usage and user satisfaction with the system.

As mentioned before, the older the employees, the more they would resist using the system and the more they might not be satisfied with it. So there might be some sort of confusion between these two variables (tenure in the job and age) because they were related to each other. However, the interviewees agreed that system usage was not affected by tenure in job positively or negatively. Satisfaction with the system was not affected, either, by tenure in job. Therefore, the organisational level and tenure in the job variables were dropped from the proposed conceptual model tested in the questionnaire survey.

- **Length of System Use**

Length of system use was perceived as one of the important variables with a great effect on system usage and user satisfaction with the IS. The interviewees thought that the more the bank employees used the same IS over and over again, the more they got used to it and the more they tended to use it and be satisfied with it.

Interviewee (3) stated, *“We usually are very cautious regarding changing or modifying the old information systems as we could face lots of resistance from bank employees who got used to the old systems and do not want us to change it”*.

It was also thought that when the length of system usage increases, the less the bank employees would need training and /or technical support from the IS department as they became, sometimes, experts with the IS.

- **System Usage**

All the interviewees agreed that system usage was usually compulsory at bank employees' level. However, at the managers' level, the system usage is voluntary. Interviewee (4) stated, *“Of course, you cannot force any manager to use the system. We provide training for them; however, if they do not want to use the system because they do not like it or they do not know how to use it, you cannot force them to use it”*.

Interviewee (5) stated, *“Some managers do not use the IS and seek the information that they need in their own personal way. Much of this information remains in a soft form, in the mind of the manager, and is verbally communicated mainly in private meetings rather than written memos or reports. In the formal meetings, employees will compete for privileged confidence of the boss and manoeuvre to get close to him by [expressing] agreement with what he is saying and the decision will be in the end what the boss thinks is right and suitable according to his viewpoint”*.

System use has always been criticised for being suitable only for voluntary use (Zmud, 1979). Therefore, in the current study, system usage is voluntary at the managers' level in the Egyptian banks.

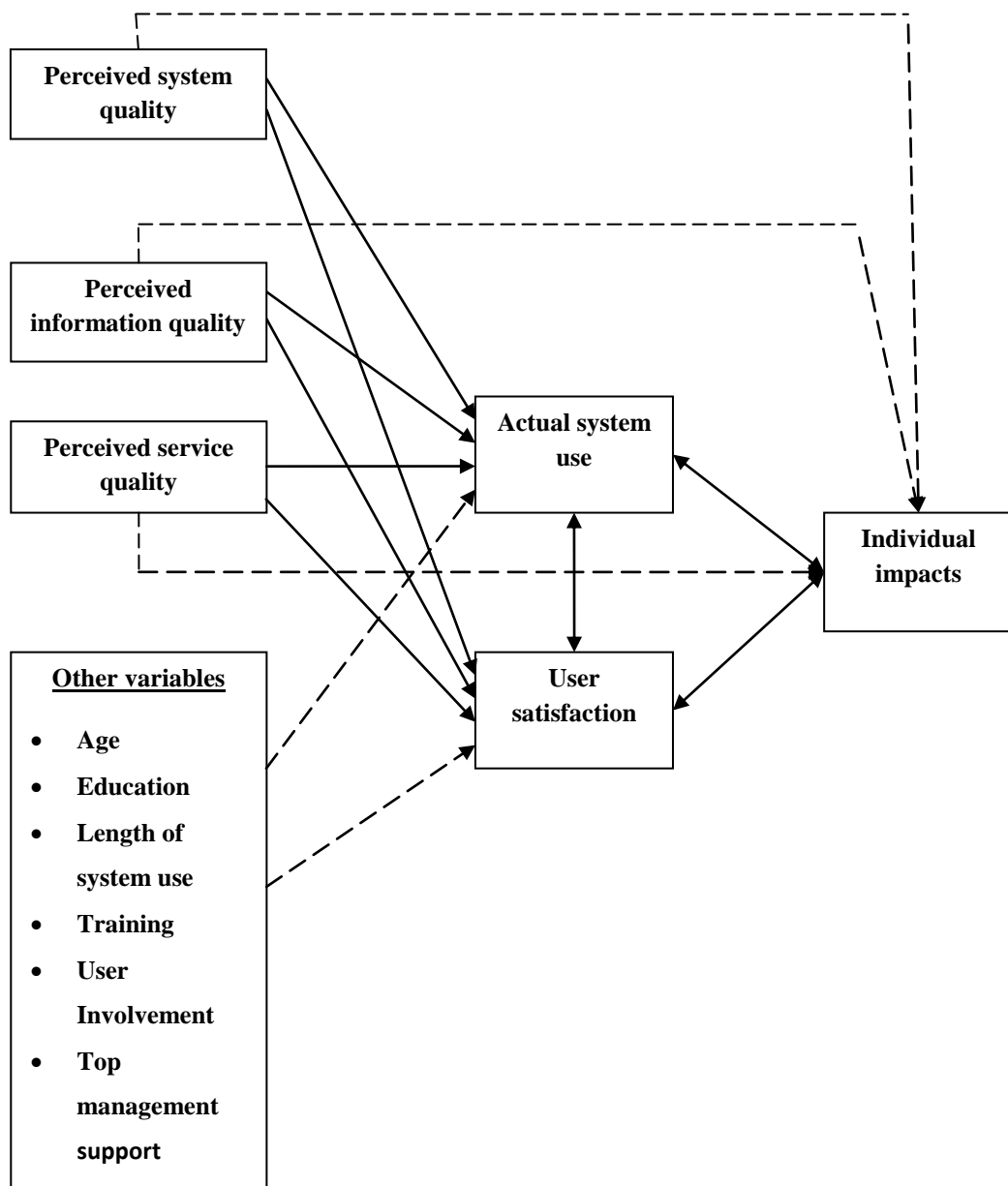
4.3 Revised Proposed Model

The proposed model is expected to change to reflect the results of the telephone interviews. So, from the analysis of the telephone interviews, we may conclude that four of the interviewees agreed that information quality, system quality and service quality were the most important factors affecting IS usage and the users' satisfaction with the system as well. However, the fifth interviewee thought that service quality did not affect system usage and/or user satisfaction.

It was also agreed that age, education level, user involvement, top management support, length of system use and training were very important in their effect on system usage and user satisfaction with the system. Nevertheless, it was not agreed that organisational level and tenure in the job variables had an effect on them. Therefore, according to the previous conclusion, the proposed model of the present study included all the variables agreed upon from the IS professionals and excluded the variables agreed to have no importance or effect on system usage and user satisfaction.

Accordingly, this study excluded organisational level and tenure in the job from the proposed theoretical research model and retained the remaining variables. The revised proposed conceptual model of the current study is therefore shown in Figure 4.1.

Figure 4.1 Revised proposed research model



4.4 Approach of study (Epistemological approach)

There are a number of research paradigms that can be used as guidance for a study. These constitute a continuum between an objective (positivist paradigm) versus a subjective (constructionist paradigm) and realism and critical theory lie between these two extremes. It is useful to discuss the epistemological considerations guiding this study. Epistemology refers to the methods of procedure leading to knowledge or the “nature of knowledge” (Bryman, 2004). Research in management has traditionally been based on positivist science, which is commonly characterised by a deductive method of

inquiry seeking theory confirmation. Nevertheless, the position is changing for management research, which gives the impression of implicitly recognising a realist perspective (Riege, 2003); to one that provides an epistemological basis for both theory testing and theory development (Miles & Huberman, 1994). Scientific realism also has fundamentals of the standard logic-empirical approach which examines patterns in observations and compares what is theoretically predicted with what is actually observed (Babbie, 2004). Orlikowski and Baroudi (1991) claimed that IS research has been dominated by a positivist research paradigm.

Although positivism is associated with deductive reasoning and phenomenology with inductive reasoning, scientific and social inquiries in practice typically involve an alternation between deduction and induction (Babbie, 2004). Phenomenological approaches stress the importance of reflexivity, an awareness of the ways in which the researcher as an individual with a particular social identity and background has an impact on the research process (Robson, 2002).

During the deductive phase, one tends to reason towards observation, whilst during the inductive phase, one reasons from observations; both deduction and induction are routes to the construction of social theories. Trochim (2001) argued that some researchers regard their work as the generation of theory (an inductive approach), whereas others consider that their research is used in order to ‘test’ existing theories (a deductive approach). In other words, a deductive approach assumes an objective reality that can be discovered through the development and testing of theories using quantitative methods and hypothesis testing. An inductive approach assumes that multiple realities exist in individuals based on their own social and personal experiences and it needs to use more subjective and qualitative methods of enquiry such as case studies. Yet Yin (2003) argued that all research programmes should start with a theoretical framework,

regardless of whether the research is explanatory, descriptive or exploratory. It has been argued that quantitative research is confirmatory and deductive in nature, whilst qualitative research is exploratory and inductive (Trochim, 2001). Table 4.1 shows the differences between the inductive and deductive approaches.

Table 4.1 Differences between quantitative and qualitative research (Neuman, 2000)

Deductive approach (Quantitative research)	Inductive approach (Qualitative research)
Objective is to test hypotheses that researcher generates	Objective is to discover and encapsulate meanings once researcher becomes immersed in data
Measures are systematically created before data collection and are standardised as far as possible	Measures are more specific and may be specific to individual setting or researcher
Theory largely causal and deductive	Theory can be causal or non-causal and often inductive
Analysis proceeds by using statistics, tables or charts and discussing how they relate to hypotheses	Analysis proceeds by extracting themes or generalisations from evidence and organising data to present coherent, consistent picture. These generalisations can then be used to generate hypotheses
Concepts in the form of distinct variables	Concepts tend to be in the form of themes, motifs, generalisations and taxonomies. However, the objective is still to generate concepts
Data are in the form of numbers from precise measurement	Data are in the form of words from documents, observations and transcripts. However, quantification is still used in qualitative research
Procedures are standard and replication assumed	Research procedures are particular and replication difficult

Much of Information Systems (IS) research conducted over the years has been known to reflect a positivistic orientation (Orlikowski & Baroudi 1991). However, despite the dominance of positivism, there are indications that interpretivism is gradually gaining ground. The perspective of interpreting information technology based on social action

and meanings is becoming more widespread since there is growing evidence that IS, in terms of development and use, is as much a social process as it is a technical one, invariably including problems related to social and organizational aspects of the system (Lyytinen & Hirschheim, 1987). Interpretivism could therefore, act as an attentive and powerful insight to the interpretation of human consciousness and subjective experience that positivism could otherwise overlook.

Since IS involves relationships between technology, people and organisations, a research approach combining the meta-methodological approaches: positivist, interpretative and critical thinking may give more insights in views of the IS phenomena (Foshay, 2008). The positivistic approach is the most widely practiced social science approach. Positivists put a great value on the principle of replication and they may use inductive and deductive inquiry, however the ideal is to develop a general causal law or principle then use logical deduction to specify how it operates in concrete situations (Neuman, 2004). Next the researcher empirically tests outcomes predicted by the principle in concrete settings by using very accurate measures. In this way, a general law or principle covers many specific situations. The majority of positivistic studies are quantitative such as experiments, surveys or existing statistics and they seek quantitative measures, test causal theories with statistics (Neuman, 2004). Therefore, in this study, positivistic approach was adopted because one of this research objectives is to test and extend a well established theory by DeLone & McLean (2003) IS success model. Therefore, positivistic and deductive approach seemed appropriate for this kind of research. In addition, by using the questionnaire survey as research method for data collection rather than interviews or observations methods, the researcher was able to generalise the findings (large sample) of the study to most banking sectors in most similar countries.

On the other hand, the interpretive approach sees the human social life is qualitatively different from other things studied by science. Most researchers who use interpretive approach adopt a version of the constructionist view of social reality in which they believe that human social life is based less on objective, hard factual reality than on the ideas, beliefs and perceptions that people hold about reality. The interpretive researchers are sceptical of the positivist attempts to produce precise quantitative measures of objective facts and believe that the best test of how good social knowledge is not replication but whether the researcher can capture the personnel perspectives of the people studied (Neuman, 2004). However, in this study, using the interpretive approach in addition to the positivistic approach would have provided more in-depth explanations and insight views of the resulted casual relationships but this will be left to future research.

The critical approach blends an objective/materialist with a constructionist view of social reality. This approach tries to put knowledge into action and goes further to try to dissolve the gap between abstract theory and the empirical experiences of using the theory to make changes in the world.

To conclude, we may say that the scientific community expands and alters theories based on empirical results. Researchers who adopt a more deductive approach use theory to guide the design of the study and the interpretation of the results. They extend, modify or even abandon or change the theory on the basis of the results. However, researchers adopting an inductive approach begin with a few assumptions and broad oriented concepts. Theory develops and grows slowly, concept by concept and proposition by proposition in a specific area. Over time, the concepts became matured and relationships became visible and researchers can then make an abstract theory from different studies.

4.5 Type of study

The three most common research classifications are exploratory, descriptive and causal/explanatory research, depending on the nature of the research problem and its structure (Babbie, 2004). In this research study, all three types of research were considered. According to Neuman (2000), an exploratory research is conducted on a new topic and is aimed at generating hypotheses for other research types such as the descriptive and the explanatory. Exploratory research is also intended to get a better understanding and to clarify the nature of ambiguous problems (Trochim, 2001). Exploratory research, therefore, will be firstly used in the early stage of this research to gain background information about the research problem, to elucidate the problem and to generate hypotheses (Churchill, 1999). The exploratory research in this study included parts of the literature review, so as to gain insight into the research problem and to identify the main issues regarding the factors affecting IS success, especially in the banking context.

Descriptive research is also used to generate hypotheses but generally has more information available than exploratory research (Malhotra, 2004). Descriptive research is usually conducted to characterise one or more variables within a population, particularly in relation to person, place and time (Zikmund, 2003). In addition, since it is used to minimise errors and maximise reliability, the survey requires a structured questionnaire and an appropriate number of respondents (Malhotra, 2004). Unlike exploratory research, descriptive studies are based on some previous understanding of the nature of the research problem (Zikmund, 2003). Thus, descriptive research will be used here to describe IT and IS, as well as the factors believed to have an influence on IS success. This part of the study, introduced in Chapters 3 and 4, informed the theoretical description or discussion.

However, descriptive research does not attempt to manipulate variables and only describes them and their relationships as they naturally occur (Malhotra, 2004). In addition, descriptive research does not determine cause and effect relationships (Zikmund, 2003) and, as a result, causal/explanatory methods have to be used in this study's survey to do this. The purpose of explanatory studies is to show the causality between variables (Babbie, 2004). A causal/explanatory method will be applied to obtain evidence of an association between variables. In addition, causal/explanatory research will be used to test the hypotheses generated from both the exploratory and descriptive research (Neuman, 2000). Causal/explanatory research tends to build on the latter and search for an explanation. Explanatory research looks for the cause or the reason a phenomenon occurs and thus goes further than description (Neuman, 2000). The main tasks in causal/explanatory research are to isolate cause(s) and to tell whether, and to what extent, 'cause(s)' produce effect (Babbie, 2004).

Longitudinal and cross-sectional descriptive types of research

According to Churchill (1999), there are two types of descriptive study, longitudinal and cross-sectional. Cross-sectional design focuses on relationships between and among variables in a single group in which all measures are taken at the same time. It is often employed in conjunction with the survey method of data collection. Longitudinal design involves repeated measures on the same variables for the same group or groups on an extended series of occasions. Such studies might either precede or follow some interventions or other events and examine their effects over time (Robson, 2002).

Although longitudinal design can help to avoid difficulties from mortality changes, it is difficult and complex to run and also requires long-term co-operation from both researchers and respondents, which is time consuming and expensive (Churchill, 1999). In addition, with the requirement of the long-term co-operation of participants, there

could be a selection bias as some people may decide to drop out, leaving highly selected individuals in the sample. Also, the nature and type of measure need to be appropriate for use on several occasions with the same persons (Robson, 2002).

On the other hand, the cross-sectional design has turned out to be a feasible way to analyse cause and effect relationships in unrelated individuals, due to lower expense and quick outcome (Neuman, 2000). In a cross-sectional study, according to Churchill (1999), a single investigation of a sample of elements selected as representatives of the studied population is undertaken. A sample survey is made when the emphasis is on the generation of statistics. However, as explained earlier, this study examines the proposed conceptual model in the banking industry from bank managers' perspectives and this can be done effectively when IS users are actively using the IS. Therefore, a cross-sectional design was more appropriate for this study.

4.6 Research study design

The research design provides a conceptual framework for the study, while the methods are the tools used to evaluate each specific aim. It provides a framework to guide data collection and analysis. Yin (2003) indicated that research design connects the initial questions of the study to the collected data and the conclusions. Yin further indicated that research design is the plan or strategy of investigation devised to enable the researcher to answer the research questions as validly and as reliably as achievable.

Accordingly, research design deals with at least four problems of carrying out successful research: what questions to study, what data are relevant, what data to collect and how to analyse the results (Yin, 2003). Generally, a research design covers strategic decisions concerning the choice of data collection methods and more tactical decisions regarding measurement and scaling procedures, questionnaire, sample and data analysis (Zikmund, 2003). Research methodology, on the other hand, according to Cooper and

Schindler (2003), is the method and procedural framework within which the research is conducted. It describes an approach to a problem which can be put into practice in a research process, which could be formally defined as an operational framework within which facts are placed so that their meaning may be seen more clearly.

Research design relates to the purpose of the study, the type of the investigation, the setting of the study, what sampling design should be used and how the data are to be collected and analysed (Sekaran, 1984).

Saunders et al. (2000) defined research strategy as “*A general plan of how the researcher will go about answering the research questions*” (p.90). They distinguished between eight research strategies, namely: experiments, surveys, case studies, grounded theory, ethnography, action research, cross-sectional studies and exploratory studies. But, the main three strategies used by most researchers are experiments, surveys and case studies (Robson, 2002).

Bryman (1989) defined survey strategy as “*the collection of data on a number of units with a view to collecting systematically a body of quantifiable data in respect of a number of variables which are then examined to discern patterns of association*” (p.104). According to Saunders, it is a popular and common strategy in management and business research (Saunders et al., 2000).

Robson (2002) defined case study as “*a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence*” (p.178).

However, “*Experiment strategy is measuring the effects of manipulating one variable on another variable, and usually it is related to the natural sciences*” (Robson, 2002, p.88).

On the other hand, there are different types of research design used for various research purposes, generally classified into three categories:

- Historical
- Experimental
- Non-experimental

4.6.1 Historical research design

Using this type of research, the researcher examines aspects of social life in a past historical time or across different cultures. The researcher combines theory with data collection which uses a mix of evidence, including existing statistics, documents (e.g. books, newspapers), observations and interviews (Sproull, 1988; Neuman, 1997).

4.6.2 Experimental research design

Experimental research design is a type of research where the researcher deliberately controls and manipulates the independent variables to affect the dependent variables in a desired way so that effects could then be measured and analysed. Experimental designs are set up to study cause/effect relationships among variables. Causal studies usually have varying degrees of artificial constraints imposed on them which interrupt the natural sequence of events.

Experimental design can be two types: classic/true experimental and quasi-experimental. The classic experimental is used where the researcher has more control over variables, while the quasi-experimental is used in situations where the classical design is difficult or inappropriate (Sekaran, 1984; Sproull, 1988; Neuman, 1997).

4.6.3 Non-experimental research design

In research where a definitive cause and effect relationship between variables is neither necessary nor possible to be established, then a non-experimental correlational research

is adopted. Since there often exist multiple factors influencing each other rather than one variable causing another, the researcher might become more interested in finding those factors associated with the research problem than establishing causality. The non-experimental research design is used when control over variables is not possible (Sekaran, 1984; Sproull, 1988).

Although research methodology is the general principle behind research and research method is the actual technique implemented in the practice of data collection, methodology and methods cannot be separated (Sproull, 1988; Neuman, 1997). According to Morvaridi (2005), the most prevalent methodologies in social sciences and humanities research methodology are quantitative and qualitative research.

4.6.3.1 Quantitative research

Quantitative research is used mainly to test a theory by testing individual hypotheses. Those hypotheses are attempts to establish relationships between variables or concepts. Quantitative research was originally developed in the natural sciences. It can be defined as research involving the use of structured questions where the response options have been predetermined and a large number of respondents are involved (Creswell, 1998).

Concepts in quantitative research are described by distinct variables. The primary data collection method is the survey using means such as questionnaires and structured interviews, which are quantifiable. Research analysis uses statistics, tables or charts, and links what they express to the hypotheses (Balian, 1982; Neuman, 1997).

4.6.3.2 Qualitative research

Alternatively, qualitative research is a method which involves collecting, analysing and interpreting data by observing what people do and say (Creswell, 1998).

Qualitative research differs from quantitative research in its way of generating information. It concentrates on a particular situation where depth is more important than

generalisation. In qualitative research, research questions are posed rather than hypothesised. Concepts take the form of themes and data take the form of words of participants from interviews and participation. Many methods are associated with qualitative research such as participant observation and unstructured interviews (Sproull, 1988; Neuman, 1997).

4.7 Research study plan

Selecting the most appropriate research approach to achieve the research aim depends on the specific research questions. Neuman (1997) concluded that to choose an appropriate data collection technique for a research question, it needs skill, practice and creativity.

In making the choice of research methodology to best answer research questions, the following points suggested in similar ways by Balian (1982), Sproull (1988) and Neuman (1997) have been taken as a guide:

1. Determine what types of data are required (opinions, attitudes, perceptions, hard data, etc.).
2. Determine the depth or generalisation needed.
3. Determine what resources are available (time and money).
4. Determine the degree of control and ability to manipulate variables.

Since this study is not a historical research and because of inability to control or manipulate variables affecting IS success, experimental research design was excluded. Therefore, the non-experimental research design was decided to be the research design of this study.

A quantitative research methodology, as mentioned earlier, collects data from the respondents and transfers them into statistical representations in tables and figures, rather than written statements of the phenomenon. The whole research process is

objectively constructed and the results are usually representative of the studied population. The main importance of the quantitative approach lies in accuracy and control. Control is achieved through sampling, design and precise, reliable quantitative measurement (Babbie, 2004).

Moreover, hypotheses are tested through a deductive approach and the use of quantitative data permits statistical analysis (Snow & Thomas, 1994). The methodology, as a result, provides answers that have a much firmer basis than a layman's common sense, intuition or opinion. Therefore, this study chose the quantitative (deductive) approach to answer the research questions and test the research hypotheses.

This study aimed to propose a model that can be used to examine the success of IS in the banking context. To accomplish this main objective, the present study adopted a methodology with two phases. In the first phase, telephone interview was used and, in the second phase, questionnaire survey. The research plan went through the following stages:

1. Review of IS and Banking industry literature
2. Interviews of IS professionals
3. Conceptual model development
4. Research process and survey development
5. Pilot study
6. Main study

The conceptual proposed model was based on the adoption of the updated DeLone and McLean (2003) model and on the previous literature review. This initial proposed model was developed from the literature and was purely conceptual. In order to test its practical relevance, the views of IS professionals in the banking sector were sought. The aim of this phase of the research was to assess the general structure and content of the

model before testing individual hypotheses through a more extensive survey. The goal of the telephone interviews was to investigate whether statements about the variables which may affect the success of BISs as found in the literature also held in practice. The interviews were semi-structured, based on a standard protocol, and aimed to identify any omissions or inaccuracies in the perceptions of experienced IS professionals in the banking sector. In this way, the theoretical underpinning of this research was supplemented by practitioners' views and a revised model reflecting both perspectives was developed and subsequently tested by the questionnaire survey.

The choice of the Egyptian banking industry as the context of the field study could be due to the fact that over that last three decades there has been a dramatic growth in the acquisition of IS in Egypt. Investment in infrastructure development in information and communication technology has witnessed major steps especially with the establishment of the Ministry of Communications and Information Technology in 1999 and the inclusion of information and communication technology diffusion on the government agenda as well as the continuous partnership with the private sector that can turn-around the level of technology penetration in society.

However, these advantages are hindered by the presence of several challenges that arise from the use of various information and communication technologies, including the need for expensive infrastructure and large start-up costs, finding qualified instructors, and the lack of face to face instruction, which may diminish the trainees interpersonal, social, and communication skills.

Many studies have been developed recently to react to these problems during the period 2000-2002 (Dahawy et al., 2005). These issues are further intensified in developing countries due to the lack of a complete infrastructure including the main building blocks such as financial resources, human resources, information resources and technological

resources. The level of IS adoption and usage in developing countries is rather low and Egypt is not an exception.

However, research indicated that there has been an increase in reported IS failures and the IT/IS adoption issues are not just technical but encompass wider social, organisational and economical factors. Organisations are having high rate of failure in adopting and using North American and/or European developed IS technologies, management processes and IS techniques in many parts of the world with different culture perspectives (e.g. Al-Mashari & Zairi, 1999) because most of the existing IS theories are rooted in North America and European countries and strongly reflect their values and beliefs. In other words, these IT/IS are culturally-biased in favour of those developed countries' social and cultural systems. This bias creates cultural and social obstacles for developing countries to accept, apply and adopt IT/IS successfully (Hill et al., 1998).

Hasan and Ditsa (1999) indicated that most studies on the use of IS in developing countries fail to distinguish IS characteristics from the technologies. They argue that, while there are some problems caused by unacceptable IS transfer to developing countries, little is known about the social and contextual influence on the IS adoption and implementation. However, on a positive note, they did observe some successful IS adoption and use in many of the developing countries. This shows that there is potential for wide economic and social benefits from the careful adoption and use of IS in developing countries.

However, the influence of both social and organisational factors on IS success in Egypt has not been examined before. Therefore, this research is significant due to the lack of prior research in this field in Egypt. As some similar previous studies were conducted on some Arab countries (e.g. Libya, Oman, Saudi Arabia, United Arab of Emirates), however these countries are different from Egypt as these countries are economically

similar regions in terms of being four of the wealthiest countries in North Africa and Arab Gulf Region.

Nevertheless, many organisations in Egypt including the financial and banking organisations have valued the importance of the IS in improving their economies and overall efficiency of their business communications systems and process. They have also allocated substantial resources for IS adoption and have begun building infrastructure to support a more reliable and quick transfer of IT/IS (Straub et al., 2001; Egypt Information Technology Report, 2009). Egypt also assisted establishing many businesses to develop IT/IS applications, conduct training and offer basic products and services to encourage their capability to better serve nationwide interests. Some banking organisations are moving to expensive ERP systems or enterprise systems (ES) as they consider technology as central to competitiveness in modern banking industries. Therefore, it is very important to evaluate and examine the success and return of these investments as the success of IS could hold various meaning in diverse cultures. Research on how people cultures observe, define and understand IS success is a neglected area, and there is a dearth of research studies in IS Egyptian banking context.

4.8 Data collection methods

There are many research methods available classified as questionnaires, interviews, observations and focus groups to collect data which in turn is classified as quantitative or qualitative (Miles & Huberman, 1994; Bryman, 2004; Remenyi et al., 1998). As mentioned earlier, there is no ideal methodology to fit all research situations; each has its own strengths and weaknesses. The question of the appropriate methodology depends to a great extent on the study's research questions and objectives. The choice of data collection method depends on many factors, such as the resources available to the researcher, the time span of the research, the accuracy required in the study, the expertise of the researcher and cost associated with each method. In the global

environment, survey research has proved to be very practical, taking into consideration future research; it allows research to be replicated in cross-cultural studies which usually span many nations. Surveys may be used for descriptive, explanatory and exploratory purposes. They are chiefly used in studies that have individual people as the units of analysis (Babbie, 2004). Although this method can be used for other units of analysis such as groups or interactions, it is necessary that some individual persons are used as respondents. In such contexts, the survey questionnaire, as an example, is a very valuable method of data collection considering the cost and difficulties other methods may endure. It provides a means for cross-cultural comparison and is probably the best method in collecting original data for purposes of describing a population too large to observe directly. In the current research, it was not possible to observe the respondents directly as this could make them feel intimidated and not behave normally. In addition, the population of the respondents were too many and located in different geographical areas which made it so difficult to conduct observations or interviews methods, therefore, surveys seemed a convenient and appropriate method for data collection. Surveys are also excellent vehicles for the measurement of attitudes, perceptions and orientations prevalent with a large population and since this research aimed at collecting data about the respondents' perceptions about different research variables, the questionnaire survey was suitable for the purposes of this research.

- **Questionnaires**

A questionnaire is a pre-written set of questions for respondents to record their answers. It is an efficient data collection technique when the researcher knows exactly what is required and how to measure the variables under study (Sekaran, 1984). Questionnaires can be administered personally, interviewers administrated, sent by mail or posted on the web. The personally administered questionnaire is used when the survey is confined

to a local area. The advantages of self-administrated questionnaire over an interview survey are: economy, speed, lack of interviewer bias and the possibility of anonymity and privacy to encourage more candid responses on sensitive issues (Babbie, 2004).

The main advantage of the mail questionnaire is its convenience when a wide geographic area and many people need to be covered. Self-administrated questionnaires allow researchers to obtain data fairly easily, then responses are easily coded and they are not expensive (Neuman, 1997). Their main disadvantage is their lack of depth, incomplete questionnaires, misunderstood questions and flexible adaptation to the divergent circumstances of respondents. In addition, this type of survey method has another disadvantage which is the probability of inaccurate data caused by subjects' bias, lying or omitting information (Sproull, 1988). However, the researcher tried to overcome these problems by conducting a follow-up plan to increase the return rate, explaining the goal and significance of the research, the importance of their participation and clearing any ambiguity in the questions.

Questionnaire design is important, because a poorly designed questionnaire will gather data which may not be relevant at the analysis stage. This research seeks to examine the proposed conceptual model in which the constructs are all conceptual. However, concepts cannot be measured directly, meaning that latent variables (concepts) must be measured by using one or more manifest variables (items that can be measured). For this study, the manifest variables were employed as sets of questions posed through self-administered questionnaires.

The questionnaire design was based on an extensive review of literature, including previous research, to ensure inclusion of a comprehensive list of items. A five-point Likert scale questionnaire survey was the main instrument used to collect data and was designed around opinion statements as a means of exploring the respondents'

perceptions on a wide range of cause and effect relationships. Questionnaire surveys using the Likert scale have been used by researchers in order to test hypotheses related to factors affecting BIS success (Teo & Tan, 2000). The goals for this study survey were to measure all variables associated with the research model and to be precise, clear and unambiguous. The questionnaire consisted of nine sections, covering the following aspects:

- Section 1 – general and demographic information about the respondent: job title, tenure in the job, gender, age, education, tenure in the banking industry, tenure in the current bank and length of system use. Andrews et al. (2001) suggested that placing the demographic data request at the beginning of the questionnaire survey may be perceived as honesty on the part of the researcher. Therefore, in this research, the demographic data were placed at the beginning of the main survey section.
- Section 2 – 7 questions about the perceived system quality, from respondents' point of view.
- Section 3- 9 questions seeking to determine the perceived information quality from respondents' point of view.
- Section 4- 24 questions aimed at identifying the perceived service quality provided by the IS department.
- Section 5- 3 questions related to the training level the subjects received in their banks. A single question about user involvement was also included.
- Section 6- 7 questions aimed at determining perceived top management support.
- Section 7- 4 questions about usage of IS by respondents.

- Section 8- 4 questions related to perceived satisfaction with the system from the respondents' point of view.
- Section 9- 10 questions about impact of the IS on individual's job performance.

The vast majority of the items in the questionnaire used a 5-point Likert scale with responses ranging from strongly disagree (value 1) to strongly agree (value 5). In section 7, one item of the four items testing system usage, relating to the number of tasks the system was used for, used a scale which indicated answers as 1= not at all, 2 = a little, 3 = moderately, 4 = much, 5 = to a great extent (See Appendix A: English version of questionnaire). The Likert scale was chosen for this survey as it tends to provide high levels of reliability and is more efficient to administer as compared with other scales (Foshay, 2008). A five-point scale was used to increase the variability in responses and to provide respondents with a 'natural' response option. In addition, Likert scale allowed using the collected data as interval data for multivariate purposes (Foshay, 2008)

As mentioned earlier in this chapter, the research plan went through several stages. Telephone interview stage preceded the questionnaire survey which led to a revised conceptual model.

Based on the above, the questionnaire survey was used to collect data. The reason behind designing a questionnaire survey for end-user managers is that they interacted with the IS on a daily basis, so they had the necessary knowledge to evaluate variables directly related to ISs and to their performance. The questionnaire was designed to be as 'user friendly' as possible to help ensure that respondents would not abandon the survey before completion.

4.9 Pilot study and questionnaire translation

Prior to distributing the questionnaire to the actual sample, a pilot study was used to discover any errors, ambiguities, inadequate answers or highlight any confusing questions. A pilot study is an important element to detect weaknesses in questionnaire design, related to validity, reliability and practicality. A pilot study is a good way of uncovering any errors and problems beforehand, instead of discovering them during the real study (Black, 1999).

In this study, the original questionnaire was developed in English. Because Arabic is the native language in Egypt, some of the participants of the study may not have had a comprehensive command of the English language and the questionnaire was translated into Arabic to avoid communication problems. To make sure that the original meaning, validity and reliability of the measurements were retained, Brislin's (1986) method for translating research instruments was used (Almutiari, 2001). Several researchers found this method to be a highly reliable and acceptable method of translating questionnaires from one language to another without changing anything in the original questionnaire (e.g. Al-Janee, 1989; AnaKwe et al., 1998; Ishman, 1998).

The translation process involved four steps: the first was translating the English version into Arabic by the researcher, then back to English by another native Arabic-speaking doctoral student, as the second English version was used to make a second Arabic translation.

During the translation, the help of five native English-speaking doctoral students was obtained to check for errors and spellings in the English version of the questionnaire and another four native Arabic-speaking doctoral students to check for errors and spellings in the Arabic version of the questionnaire as well. Then, one Arabic researcher who speaks both English and Arabic compared the English and Arabic versions with

each other. All concepts in the original questionnaire retained their meanings after the translation process.

Once the questionnaires were translated, a general check for the suitability of this questionnaire for the Egyptian banking industry context was needed. Two IS professionals (BIS managers) agreed to be consulted to check the suitability of the questionnaire items for the Egyptian managers in particular and the banking workplace in general. The reason for choosing IS managers for this stage rather than regular bank managers is that IS professionals were more familiar with the wording and terminology used in banks from their work experience with ISs and from feedback reports from all bank employees and managers at all levels.

The two professionals determined that the questionnaire was appropriate, although they suggested some changes in the wording for some measurements to be more relevant to the Egyptian banking industry workplace. After the review of the modified questionnaire, no additional changes were suggested.

Once the questionnaire was finalised, it was further tested in a pilot study. This was done in two Egyptian banks (Alexandria Bank and National Bank of Egypt); formal approval to conduct the pilot study in the two banks was obtained as part of the overall approval to conduct the study. The purpose of this pre-test was to validate that the sentence structure of the questions was clear and understandable.

This pilot-testing was personally administered as 10 questionnaires were distributed in the two banks. To encourage individuals to participate, meetings were held with the employees and their superiors, during which the goal of the study was explained. Moreover, the participants were encouraged to comment on and discuss any part of the questionnaire they might consider ambiguous. The participants were also encouraged to write comments about any questions which might be unclear.

All 10 questionnaires were collected (100% response rate in the pilot phase). Each section of the questionnaire was reviewed, including both wording and content. Overall, the pilot study participants indicated that the questionnaire was understandable; some had a few minor wording changes and clarifications. For example, the term ‘information system’ was not clear enough for some participants, so the term ‘computer’ and its Arabic translation were added to the questionnaire.

The questionnaire was modified, taking into consideration these suggestions. Once the changes were complete, an informal discussion of the second version of the questionnaire took place with another eight participants (only 8 bank managers agreed to discuss the second version of the questionnaire with the researcher). Those participants confirmed that the modified questionnaire was clearer than the first and did not suggest any further changes.

In this study, after the instruments and the procedures were approved, the questionnaire was administered to the managers at their workplace. This started with an initial contact with branch managers of the selected banks to explain the goal and significance of the research, the importance of their participation and to set a date and a time for them to complete the questionnaire. Next, the questionnaires were distributed. At the beginning of each survey administration session, the participants were thanked for their interest and cooperation and the goal, significance of the research and the importance of their participation were briefly introduced.

Subjects were told that the study was for a doctoral thesis attempting to develop a model for evaluating ISs in the banking industry. Furthermore, the subjects were advised that participation in the survey was completely voluntary and that all the responses would be kept confidential. Finally, the participants were instructed that there were no right or

wrong answers and they needed only to record their first perceptions after reading each question.

The participants were given all the time they needed to complete the survey and envelopes were also provided for the completed questionnaires.

Some banks agreed to return the completed questionnaires on the same day they were distributed, others requested a week or so to collect the completed questionnaires as their managers were very busy. Thus, in order to give the participants all the time they needed for completion and to ensure that the answers reflected the real perceptions of the participants, it was agreed to come back on the selected day and collect.

In the banks requiring more than one day for processing the survey, a three-step follow-up plan was used, as suggested by Malhotra (2004). First, the questionnaires were distributed; the participants were given the researcher's telephone number, were also reminded of the email address on the cover letter, and were advised not to hesitate to call at any time if they had any questions regarding the questionnaire. Second, three days after the questionnaires were distributed, the banks were visited to answer any questions the participants might have had and to remind them about the day for the questionnaires to be collected. Third, the day before collection, telephone calls were made to the participants. Those able to be reached were given the opportunity to ask any questions they might have and to remind them when the questionnaires would be collected. In addition, they were asked to share the message with any other colleagues who could not be reached by phone.

Some participants, after they agreed to participate in the study, ignored the questionnaire and did not complete it at all and others lost it, so the questionnaires had to be redistributed to those participants who had lost them. Therefore, the survey distribution process took a long time between distributing, redistributing and collecting

the completed questionnaires, and collecting the uncompleted questionnaires at another time, so the actual data collection lasted between mid-December 2007 and mid-March 2008.

In order to avoid the response set bias in the current research- a tendency of some respondents to agree and not really decide- it was best to offer respondents explicit alternatives rather than specific statements as less well educated respondents are more likely to agree with a statement, whereas forced choice alternatives encourage thought and avoid the response bias set (Neuman, 2004). Also bias can be created if question wording gave respondents a reason for choosing one specific alternative.

In this research, the researcher aimed to eliminate bias to obtain more objective answers from the respondents and this was done by taking these actions:

1. The questionnaires were personally distributed and collected by the researcher and no one else had any control over the questionnaires during the process of distribution and collection at any stage in order to make sure that the questions responses were chosen freely.
2. The questionnaires were not distributed by emails so the confidentiality of the respondents was met completely.
3. The top managers of the banks in the sample had no control at all over the questions but they only read the questionnaire before the distribution to make sure that it did not include any political or sensitive issues.

A total of 580 questionnaires were distributed, 500 in the first wave and 80 in the second. In the first wave, 304 questionnaires out of 500 were returned, and in the second, 37 out of 80. This made the total returned questionnaires 341 and the response

rate for the two waves of distribution 68%. This response rate is considered high in the social science context.

Out of the 341 questionnaires, 84 were eliminated as incomplete, where respondents left one or more of the questions assessing perceived information quality, perceived system quality, perceived service quality, system usage, user satisfaction or individual impacts unanswered, and were subsequently deemed void.

This made the total number of usable questionnaires 257 (44%) and 323 (56%) out of 580 questionnaires were incomplete or not returned. Table 4.2 shows details of questionnaire distribution, collection and response rate.

Table 4.2 Questionnaires distribution and response rate for 25 banks

Bank / bank branches	Total distributed	Total collected	Total usable	Response rate
National Bank of Egypt (branch1)	25	19	15	60%
National Bank of Egypt (branch2)	25	18	14	56%
National Bank of Egypt (branch3)	25	15	12	48%
Cairo Bank (branch1)	23	13	10	43.5%
Cairo Bank (branch2)	23	12	9	39.1%
Bank Misr (branch1)	22	16	12	54.5%
Bank Misr (branch2)	25	19	14	56%
Industrial Development Bank of Egypt	24	16	12	50%
Alexandria Bank (branch1)	23	10	7	30.4%
Alexandria Bank (branch2)	22	12	9	40.9%
Cairo Barclays Bank	25	9	6	24%

National Societe General Bank	23	12	9	39.1%
Al Watany Bank of Egypt	22	14	10	45.5%
Audi Bank S.A.E.	25	18	13	52%
Ahli United Bank- Egypt	22	11	9	40.9%
Suez Canal Bank	20	15	11	55%
Commercial International Bank (Egypt) S.A.E.	22	13	7	31.8%
Blom Bank- Egypt	12	12	12	100%
Egyptian Gulf Bank	23	11	8	34.7%
National Bank for Development (branch1)	23	9	7	30.4%
National Bank for Development (branch2)	25	14	12	48%
Housing and Development Bank	23	15	10	43.5%
Faisal Islamic Bank of Egypt	23	10	7	30.4%
HSBC Egypt (branch1)	22	13	10	45.5%
HSBC Egypt (branch2)	24	15	12	50%
Total	580	341	257	44%

4.10 Research model operationalisation

Figure 4.1 presents the proposed conceptual model for the study. Chapter 4 detailed the literature supporting the creation of this model and chapter 5 presented the details of IS professionals' interviews which led to a revision of the research model in Figure 5.1. In order to empirically test this revised proposed model, all variables of the model must be operationalised. Due to the lack of validated and reliable instrument in Arabic language for assessing the factors influencing the success of IS, the current study translated widely-cited and used Western-developed instruments, which have been validated and found to be reliable. Therefore, existing measures of IS success taken from the literature

with acceptable psychometric qualities were used. There are many approaches to measuring IS success. Some researchers have developed approaches to measuring success in specific industries by incorporating the various dimensions of the DeLone and McLean model (Weill & Vitale, 1999; Skok et al., 2001). However, there are many scales that have been used to measure the dimensions of the IS success model individually, with some being more thorough than others. What follows is a brief discussion of the theoretical foundation for the items used to operationalise the constructs in the model in the questionnaires (see Appendix A for final version of questionnaire).

- **Perceived System Quality**

System quality is related to whether or not there are bugs in the system, user interface consistency, ease of use and interactive systems' responses rates (Seddon & Kiew, 1994).

Researchers have used many surrogate measures for system quality, ranging from single-item to multi-item scales. Perceived ease of use was one of the most common measures of research relating to the Technology Acceptance Model (TAM) (Davis, 1989). However, only perceived ease of use does not capture the system quality construct as a whole. As an example for the single-item scales, Edstrom (1977) measured the success of an IS through one question by which users rated the implemented system, while the multi-item instrument measured system quality through various measures such as perceived value of worth, usefulness and perceived ease of use (e.g. Davis, 1989). Bailey and Pearson (1983) developed and validated an instrument to measure user satisfaction and seven items were assigned to measure system quality. This instrument has been validated by several researchers (Almutairi, 2001; Ives, 1983; Baroudi & Orlikowski, 1988; Iivari & Ervasti, 1994; Mahmood & Becker, 1985, 1986; Li, 1997; Elnady & Elkordy, 1997) and has

become a standardised measure in the IS field. Rivard et al. (1997) also developed and tested an instrument that consisted of 40 items that measured eight system quality factors: reliability, portability, user friendless, understandability, effectiveness, maintainability, economy and verifiability.

Doll and Torkzadeh (1988) developed an instrument to measure end-user computing satisfaction (EUCS), which merged items measuring quality of information (content, format and timeliness) with items measuring quality of the system (accuracy, ease of use), and there were 13 items, four of which were designed to measure system quality. This instrument was validated by Torkzadeh and Doll (1991) and Hendrickson et al. (1994).

Table 4.3 summarises the empirical measures of system quality.

Table 4.3 Measures of system quality

Authors	Description of study	Type	Description of measure(s)
Bailey & Pearson(1983)	Overall IS, 8 organisations, 32 managers	Field	1. Convenience of access 2. Flexibility of system 3. Integration of systems 4. Response time
Edstrom(1977)	-----	Field	Rating implemented system
Barki & Huff(1985)	DSS, 9 organisations, 42 decision makers	Field	Realisation of user expectations
Belardo, Karawan & Wallace(1982)	Emergency management DSS10 emergency dispatchers	Lab	1. Reliability 2. Response time 3. Ease of use 4. Ease of learning
Doll & Torkzadeh(1988)	-----	Field	System ease of use and system accuracy
Conklin, Gotterer & Rickman(1982)	Transaction processing ,1 organisation	Lab	Response time

Franz & Robey(1986)	Specific IS, 34 organisations, 118 user managers	Field	Perceived usefulness of IS (12 items)
Goslar(1986)	Marketing DSS, 34 marketers	Lab	Usefulness of DSS features
Hiltz & Turoff (1981)	Electronic information exchange system	Field	Usefulness of specific functions
Kriebel & Raviv(1982)	Academic IS, 1 university	Case	1. Resource utilisation 2. Investment utilisation
Lehman(1986)	overall IS, 61 IS managers	Field	IS sophistication (use of new technology)
Mahmood(1987)	Specific IS 61 IS managers	Field	Flexibility of system
Morey (1982)	Manpower management system 1 branch of military	Case	Stored record error rate
Srinivasan(1985)	Computer-based modelling system 29 firms	Field	1. Response time 2. System reliability 3. System accessibility

However, from the previous discussion, perceived system quality was designed to determine user perceptions regarding the IS perceived quality. Therefore, the Bailey and Pearson (1983) instrument was used to operationalise the system quality variable on a 5-point Likert scale. The reason for using this instrument is that it is a widely accepted measure and has been validated by several researchers as mentioned previously. In addition, this instrument consisted of seven items which covered many aspects of

system quality such as response/turnaround time, convenience of access, language, flexibility of system and integration of system.

Seven items from Bailey and Pearson (1983) were included in this scale (Table 4.8).

The users were asked about their perceptions regarding system quality: ease and difficulty of using the capabilities of the system (convenience of access), trust in the system (confidence in the system), flexibility of the system, the time lapse between request for data and response to that request (response/turnaround time), integration of the system, balance between cost and benefits (charge-back method of payment for services) and ease and difficulty of the sentences and words used in the system (language). This 5-point Likert scale ranged from “strongly agree” to “strongly disagree” and the layout of the scale was modified to make it clearer and to remove any sense of vagueness. As the original scale consisted of multiple answers for each question, for example the answers for one of the questions were: Fast / Slow, Good / Bad and Consistent / Inconsistent, it was seen that keeping the original as it was would make the scale confusing and difficult to understand. Therefore, it was decided to make one answer for the questions ranging from “strongly agree” to “strongly disagree”.

- **Perceived Information Quality**

Information quality is related to issues such as timeliness, accuracy, relevance and format of information provided by an IS (Seddon & Kiew, 1994). Researchers have used many surrogate measures. Information quality is often a key dimension of end-user satisfaction instruments (Ives et al., 1983; Baroudi & Orlikowski, 1988; Doll et al., 1994). As a result, information quality is often not distinguished as a unique construct but is measured as a component of user satisfaction. Therefore, measures of this dimension are problematic for IS success research. However, Bailey and Pearson (1983) developed a user satisfaction instrument, which included nine items measuring

information quality: accuracy, timeliness, precision, reliability, currency, completeness, format of output, volume of output and relevancy. The instrument has been validated by several researchers (Almutairi, 2001; Ives et al., 1983; Baroudi & Orlikowski, 1988; Iivari & Ervasti, 1994; Mahmood & Becker, 1985, 1986) and has become a standard measure in the IS field. However, Gallagher (1974) assessed information quality by using two measures of perceived value; the first was an estimated Dollar value in response to the following question: *“Assume that your company plans to eliminate all data processing and to obtain their report from another firm on an annual subscription basis. What is the maximum amount you would recommend paying for this report for you?”* (Gallagher, 1974, p.48) and the second was fifteen 7-point semantic differential bipolar scales of adjective pairs on which the respondent was asked to indicate his opinion of the report. The 7-point scale ranged from -3 (extremely unfavourable) to +3 (extremely favourable). The second score on this measure of perceived value was the average of responses to all 15 adjective pairs.

The Doll and Torkzadeh (1988) instrument included eight items scored on a 5-point Likert-type scale that assessed information quality through its content, format and timeliness. Table 4.4 summarises the empirical measures of information quality:

Table 4.4 Measures of information quality

Author	Description of study	Type	Description of measure(s)
Bailey & Pearson (1983)	Overall IS, 8 organisation, 32 managers	Field	Output <ul style="list-style-type: none"> 1. Accuracy 2. Precision 3. Currency 4. Timeliness 5. Reliability 6. Competence 7. Conciseness 8. Format 9. Relevance
Blaylock & Rees	Financial, 1 university	Lab	Perceived usefulness and

(1984)	16 MBA students		specific report items
Jones & McLeod (1986)	Several info. sources 5 senior executives	Field	Perceived importance of each information item
King & Epstern (1983)	Overall IS, 2 firms 67 managers	Field	Information 1. Currency 2. Sufficiency 3. Understandability 4. Freedom from bias 5. Timeliness 6. Reliability 7. Relevance to decisions 8. Comparability 9. Quantitativeness
Doll & Torkzadeh(1988)	-----	Field	Content, format, and timeliness
Mahmood (1987)	Specific IS, 61 IS managers	Field	1. Report accuracy 2. Report timeliness
Mahmood & Medewitz (1985)	DSS, 48 graduate students	Lab	Report usefulness
Miller & Doyle (1987)	Overall IS, 21 financial firms, 276 user managers	Field	1. Completeness of information 2. Accuracy of information 3. Relevance of reports 4. Timeliness of report
Rivard & Huff (1985)	User developed IS 10 firms, 272 users	Field	Usefulness of information
Srinivasan (1985)	Computer-based modelling system, 29 firms	Field	1. Report accuracy 2. Report relevance 3. Understandability 4. Report timeliness
Gallagher(1974)	-----	Field	Perceived value of quality of report

Therefore, from the previous discussion, perceived information quality was designed to determine user perceptions of IS perceived information (output) quality. Therefore, the Bailey and Pearson (1983) instrument was used to operationalise the information quality dimension because this instrument has been validated by several researchers and is a standard measure for information quality in the IS field. Besides, it covers many aspects of information quality such as accuracy, reliability and currency.

Nine items adopted from Bailey and Pearson (1983) was included in this scale (Table 4.8). The respondents were asked about their perception of the information quality produced by the IS. They were asked about information availability or amount of information (volume of output), information consistency (reliability), information variability (precision), information comprehensiveness (completeness), information correctness (accuracy), information age (currency), the availability of information in the suitable time (timeliness), display of output (format of output) and the degree of congruence with what users need (relevancy). This instrument used a 5-point Likert scale ranging from “strongly agree” to “strongly disagree”. The layout of the scale was modified to remove any confusion from the scale. As mentioned in the previous section, the original scale had multiple answers to each question, so it was modified so as to contain just one answer in each question, ranging from “strongly agree” to “strongly disagree”.

- **Perceived Service Quality**

Service quality is one of the most researched areas of marketing literature generally and services marketing literature specifically (Jensen & Markland, 1996). Researchers concluded that service quality was founded on a comparison between what the customer feels should be offered and what is actually provided (e.g. Bolton & Drew, 1991). Other marketing researchers (e.g. Cronin & Taylor, 1992; Taylor & Baker, 1994) support the

notion that service quality is the discrepancy between customers' perceptions and expectations. There is some support for this argument in the IS literature. Conrath and Mignen (1990) reported that the second most important component of user satisfaction, after general quality of service, is the match between users' expectations and actual IS service.

Parasuraman et al. (1988) defined service quality as the gap between customers' expectations of service and their perceptions of the service experience and suggested that service quality can be assessed by measuring customers' expectations and perceptions of the performance levels for a range of service attributes. Then the difference between expectations and perceptions of actual performance can be calculated and averaged across attributes. As a result, the gap between expectations and perceptions can be measured with the now-standard SERVQUAL multi-item survey instrument.

Parasuraman et al. (1988) operationalised their conceptual model of service quality by following the framework of Churchill (1979) for developing measures of marketing constructs and they resulted in a 45-item SERVQUAL instrument, for assessing customer expectations and perceptions of service quality in service and retailing organisations. The first part of the SERVQUAL instrument consisted of 22 questions for measuring expectations and these were framed in terms of the performance of an excellent provider of the service being studied. The second part had 22 questions for measuring perceptions and questions were framed in terms of the performance of the actual service provider. The final part was a single question to assess overall service quality. Underlying each of the 22 items were five dimensional-constructs used by customers when evaluating service quality, regardless of the type of service:

Tangibles: physical facilities, equipment and appearance of personnel.

Reliability: ability to perform the promised service dependably and accurately.

Responsiveness: willingness to help customers and provide prompt service.

Assurance: knowledge and courtesy of employees and their ability to inspire trust and confidence (communication, competence, credibility, courtesy and security)

Empathy: caring, individualised attention the service provider gives customers.

Hochstein et al. (2004) proposed that SERVQUAL could be used in an IS context and proposed some examples of IS-SERVQUAL instrument items which can be used to apply the SERVQUAL instrument in the IS field:

- " The IS has up-to-date hardware and software" (tangible)
- "The IS is dependable " (reliability)
- " IS employees give prompt service to users" (responsiveness)
- "IS employees have the knowledge to do their job well " (competence)
- "IS has users' best interests at heart" (empathy)

This shows that SERVQUAL, an extensively applied marketing instrument for measuring service quality, has been and can be applied in the IS arena. However, despite SERVQUAL's being the most frequently used measure for service quality in IS, it has been subject to considerable debate regarding its validity, dimensions and the wording of items (Pitt et al., 1995; Kettinger & Lee, 1997). It has also been challenged and received some criticism (Van Dyke et al., 1997) through identification of problems of reliability, discriminant validity and predictive validity of the measures.

Nevertheless, after examining seven studies, Fisk et al. (1993) concluded that researchers generally agreed that the SERVQUAL instrument is a good predictor of overall service quality. In addition, by using confirmatory factor analysis, Jiang et al. (2002) investigated 168 end-users and IS professionals (IS staff) and concluded that the

SERVQUAL measure is a valuable analytical tool for IS managers. The study found high convergent validity for the reliability, responsiveness, assurance and empathy of the SERVQUAL scales and acceptable levels of reliability and discriminant validity among the reliability, responsiveness and empathy scales. . On the other hand, other measures of service quality have included the skill, experience and capabilities of the IT support staff (Yoon & Guimaraes, 1995). As a result of the growing popularity of outsourcing for systems development and support, service quality often involves an external provider. The responsiveness of the vendor affects the perception of how cooperative that vendor will be (Gefen 2000).

Thus, the current study adopted the Parasuraman et al. (1988) SERVQUAL instrument and used the Pitt et al (1995) instrument to measure the perceived service quality variable. Because the present research is interested in obtaining the bank managers' perceptions regarding the factors which might have an effect on IS usage and user satisfaction with the system, these two factors might consequently have an effect on individual performance.

Therefore, the IS-SERVQUAL instrument in this study used the second part of the SERVQUAL items which consists of 22 questions for measuring perceptions, framed in terms of performance of the actual service provider, and the final part which asked users about their perceptions regarding the quality of the whole service provided. The number of some items was modified to make them more suitable and to eliminate any ambiguity. For example, the first statement (The IS has up-to-date hardware and software) was divided into two (1) The IS has up-to-date hardware, (2) The IS has up-to-date software. Then, the total service quality questions were 24 questions. The 24 items adopted from Parasuraman, Zeithaml and Berry (1988) used in this scale included

five-dimensional constructs (Table 4.8) consisting of Tangibility (5 items), Reliability (4 items), Responsiveness (5 items), Assurance (4 items) and Empathy (6 items).

- **Demographic and situational factors**

The user-related (demographic) and context-related (situational) factors which were tested in the present study included the following variables:

(1) Age: This is considered as one of the factors that may affect the acceptance of a new technology or usage of the existing technology (Elnady & Elkordy, 1997; Almutiari, 2001). Age is an important factor of work behaviour in general and end user computing specifically (Igbaria et al., 1989; Ang & Soh, 1997). Therefore, age was used in this study and measured using 5 intervals: Under 20, 20-29, 30-39, 40-49 and 50 and over, as users were asked about their age and if it was in any of the categories mentioned in the questionnaire. The reason for choosing five intervals is that it was thought that a decade (10 years) is a long enough time for users to separate between one age group and another, as if the age group spanned more than 10 years, it may have big perceptual differences between users in the same age group. Since in the Egyptian banking industry, 60 is the age of retirement for all bank employees, it was thought that dividing age groups into five intervals (10 years each) would make users in each age group have more similarities and consistency in their IS perceptions. Table 4.8 shows the different categories of the age variable.

(2) Education: The level of the formal education of the employee may affect his/her ability to manage work problems and to use more information sources (Elnady & Elkordy, 1997). However, prior research had mixed findings regarding the relationship between formal levels of education and IS usage and satisfaction.

In this study, the educational level was classified into six categories, according to the educational levels in Egypt: Less than high school, high school, high school and some college, bachelor, master and doctorate. The users were asked about their educational level according to the six different categories. Table 4.8 shows the different categories of the education level variable.

(3) Length of system use: This refers to user expertise in a user's experience and skill level with regard to IS usage and development (Igbaria et al., 1995). The more time the user uses the IS, the more likely he/she promotes more favourable attitude about the usefulness of the IS, which may then increase his /her satisfaction with it (Harrison & Rainer, 1992; Taylor & Todd, 1995). Having experience, due to a long time of IS usage increases perceived behaviour control, highlighting confidence and favourable feelings about IS usage and satisfaction (Simmers & Anandarajan, 2001).

In this study, a single item was used for users' length of time using IS. In other words, the subjects were asked about how many years they had been working with the IS as mentioned in detail Table 4.8.

(4) Training: User training is considered as one of the most important factors with a great effect on system usage and satisfaction with the system (e.g. Nelson & Cheney, 1987; Igbaria et al., 1995; Guimaraes & O'Neal, 1995), as more understanding of the system in use may be expected to increase satisfaction towards the IS. In this research, training was measured by using the Maish (1979) and Elnady and Elkordy (1997) measurement, in which the users were asked three questions or three indicators with 6 items: The respondents were asked about (1) how much training they received when they first used the IS, (2) whether they received on-site or off-site training (from Elnady and Elkordy, 1997) and (3) whether they felt completely prepared for the system when they used it for the first time (Table 4.8). The first question had three answers, the

second two answers and the third a 5-point Likert scale, ranging from (1) strongly agree to (5) strongly disagree.

The reason for choosing Maish's instrument is that it consisted of two key questions on the level of training provided which was the amount of perceived level of training when IS was first being used and the users' perceptions of their full preparation for the IS, as it was also thought that these ones were the main two items to capture the perceived level of the IS training variable. As for the third question about off-site or on-site training, there are several ways to get IS training such as college courses, vendor training, in-house training and self-study (Igbaria et al. 1995); however, the only two sources of training in the Egyptian banking industry were either off-site or on-site training.

Some modifications were made to the layout and wording of the scale to make it less complicated and easier to understand. As for the first question, in the original scale there were four answers but the second answer (received some information about the system beforehand) was dropped because it was perceived that it could confuse the users as they were asked about the level of training received but some information may not be considered as some kind of training. As for the third question, in the original scale there were 5 answers; however, it was thought that the differences between these 5 answers may not be clear enough to the respondents. For example, the answers included: (1) unprepared, (2) unsure of how to respond in most situations, (3) reasonably prepared for most situations, (4) confident of how to respond in most situations and (5) completely prepared for it. Therefore, it was decided to drop these 5 answers and ask one question with one answer on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree".

(5) User Involvement: This is considered as one of the important factors which may affect user satisfaction and/or usage of the IS (Elnady & Elkordy, 1997; Hwang & Thorn, 1999). In this study, user involvement or user participation is defined as the behaviour and activities of users or their representatives during the system development process (Barki & Hartwick, 1994). Therefore, user involvement in the pre-implementation (design) and after-implementation stage (development) is very important. Thus, user involvement was measured by Maish's (1979) instrument, in which the users were asked, in a 5-point Likert scale, if they were fully involved in the design and development of new ISs. The reason for choosing Maish's instrument is that it measures users' perceptions and impressions regarding the level of their involvement when major IS changes or new ISs are planned.

However, the Maish (1979) scale was modified as the original scale consisted of 7 items; however, the current research eliminated some during pre-testing as they were confusing and unclear. For example, some of the answers were as follows: (1) are not consulted, (2) are consulted but the recommendations are ignored, (3) are consulted by information services frequently, (4) participate equally on a design task force, and (5) design the new system with technical help. Therefore, it was decided to drop these 7 answers and ask one question with one answer on a 5-point Likert scale (Table 4.8).

(6) Perceived Top Management Support: This is also considered as one of the most important factors which may affect the IS performance (Al-Mashari, 2000; Brown & Vessey, 1999; Davenport, 2000; Estevez, 2000; Nah, 2001; Smyth, 2001; Stewart, 2000; Sumner, 2000) and as a significant factor in influencing the success of the IS in an organisation (e.g. Apigian, 2004; Sabherwal et al., 2006).

In this research, top management support was measured by using the Apigian et al. (2004) instrument which consisted of 7 items (Table 4.8) ranging from "strongly agree"

to” strongly disagree” on a 5-point Likert scale. Users were asked if the top management is strongly involved with the IS, interested in the IS, understands importance of the IS, supports the IS, considers the IS as a strategic resource, understands the IS opportunities and keeps pressure on operating units to work with the IS.

- **System Usage**

Igbaria, Pavri and Huff (1989) indicated system usage in related questions: what is the actual use of the IS, to what extent is the IS used in the users’ jobs and how many IS packages are used in the users’ jobs. Researchers have used a variety of instruments to measure system use. These range from actual behaviour (e.g., Schewe, 1976), documented usage (e.g., Ein-Dor, Segev and Steinfeld, 1981), to self-reported perceptions of past usage (e.g., Lucas, 1975). These different measures could potentially lead to mixed results between use and other constructs in the DeLone and McLean model. For example, research has found a significant difference between self-reported use and actual use (Collopy, 1996; Payton & Brennan, 1999). In addition, heavy users tend to underestimate use, while light users tend to overestimate. This suggests that self-reported use may be a poor measure for actual. However, Kim and Lee (1986) developed a measure for usage which took into account the voluntary aspect. Kim and Lee’s measurement used frequency and voluntariness of use. Each was measured on a single-item, 7-point Likert-type scale from 1 (much less frequent use) to 7 (very frequent use). The scale associated with voluntariness was anchored by 1 (completely mandatory use) and 7 (completely voluntary use). To compute the system usage index, the responses to the two items were multiplied (thus, with a range from 1 to 49) and the square root of the product was taken for normalising the scale.

Doll and Torkzadeh (1998) developed a multidimensional measure of how extensively IT

was used in an organisational context of decision support, work integration and customer service function. The instrument consisted of 74 items, 62 of which measured system use, while 12 measured the impact of IT on work. Using a sample of 89 usable interviews, the instrument was validated. Table 4.5 summarises the empirical measures of system use.

Table 4.5 Measures of system use

Description of measure(s)	Type	Description of study	Author
Use or non-use of computer-based decision aids	Lab	Work force and production scheduling DSS 1 university 54 graduates	Alavi & Henderson (1981)
Use of IS to support production	Field	Overall IS, 200 firms 200 production managers	Baroudi, Olson, & Ives(1986)
Percentage of time DSS used in decision making situations	Field	DSS, 9 organizations, 42 decision makers	Barki & Huff(1985)
Use of numerical vs. no numerical information	Lab	Financial 30 financial	Bell (1984)
1. Frequency of use 2. Voluntariness of use	Field	Overall IS, 32 organizations 132 users	Kim & Lee (1986)
1. Number of queries 2. Nature of queries	Lab	Strategic system, 1 university 45 managers	King & Rodriguez (1981)
Extent of use	Lab	DSS, 48 graduate students	Mahmood & Medewitz (1985)
Actual daily use of computer, frequency of use, number of packages used and number of tasks system was used for	Field	9 organisations in Nigeria	Igbaria, Pavri & Huff(1989)

Igbaria et al. (1989) developed a four-item scale to measure this variable and the instrument has been proven reliable and valid (e.g. Igbaria, 1992; AnaKwe, Anandaeajan & Igbaria, 1998). Thus, building on Igbaria (1992), Igbaria et al. (1989) and AnaKwe, Anandaeajan and Igbaria (1998), in this study, system usage was measured in four different ways (Table 4.8). Respondents were asked to answer on a 5-point Likert scale ranging from 1 “Not at all” to 5 “To a great extent”, a simple pre-coded question regarding (1) actual daily use of the computer, (2) frequency of use, (3) number of packages used by participants and (4) number of tasks the system was used for,. Therefore, this scale was used to operationalise system use in this study in which the subjects were asked about the hours they spent on the system, frequency of use of the computer, different tasks the IS might help in performing and number of computer packages used by respondents.

- **User Satisfaction**

User satisfaction is considered one of the most usable measures of IS success (Seddon, 1997) and examines the successful interaction between the IS itself and its users (Glorfeld, 1994). Some researchers (e.g. Bailey & Pearson, 1983; Barki & Huff, 1985; DeLone & McLean, 1992; Ives & Olson, 1984; Robey, 1979; Swanson, 1994) reviewed the results of 45 user satisfaction studies conducted between 1982 and 2000 and they found that the Bailey and Pearson (1983) instrument was the most frequently used measure of user satisfaction.

The Doll et al. (1994) instrument, End-User Computing Support (EUCS) instrument and the Ives et al. (1983) User Information Satisfaction (UIS) instrument are three of the most widely used user satisfaction instruments (Almutairi, 2001). However, both the EUCS and UIS instruments contain items related to system quality, information quality and service quality, rather than only measuring overall user satisfaction with the system. Because of

this, some researchers have chosen to parse out the various quality dimensions from these instruments and either use a single item to measure overall satisfaction with an information system (Rai et al., 2001) or a semantic differential scale (Seddon & Yip, 1992).

The popularity of user satisfaction as a measure of IS success has led researchers to operationalise this dimension in many ways. For example, Ginzberg (1981) used a single item to assess overall user satisfaction, asking users how satisfied they are with the system?

In a different approach, other researchers have developed multi-item instruments to assess user satisfaction. For example, Bailey and Pearson's (1983) instrument focused on general user satisfaction. The instrument included 14 items focusing on users' perceptions of IS success. The instrument has also been reduced to eight items and revalidated by other researchers (e.g. Ives et al., 1983; Baroudi & Orlikowski, 1988; Iivari & Ervasti, 1994; Mahmood & Becker, 1985/1986). Iivari and Ervasti (1994) studied in an organisation with 8000 employees (Oulu City Council) and they found that the user information satisfaction (UIS) instrument was valid and reliable.

In the same vein, Doll and Torkzadeh (1988) merged ease of use and information product items to measure the satisfaction of users who directly interacted with the computer, using specific applications. Torkzadeh and Doll (1991) and Hendrickson, Glorfeld and Cronan (1994) have validated the instrument. Table 4.6 summarises the empirical measures of user satisfaction.

Table 4.6 Measures of user satisfaction

Author	Description of study	Type	Description of measures
Alavi & Henderson(1981)	Work force and production scheduling DSS, 1 university, 45	Lab	Overall satisfaction with DSS

	graduate students		
Bailey & Pearson(1983)	Overall IS, 8 organisations, 32 managers	Field	User satisfaction (39 item instrument)
Doll & Ahmad(1985)	Specific IS, 55 firms 154 managers	Field	User satisfaction (11 item scale)
Ginzberg(1981)	Overall IS, 35 IS users	Field	Overall satisfaction
King & Epstein(1983)	Overall IS, 2 firms 76 managers	Field	User satisfaction (one item: scale 0 to 100)
Mahmood(1987)	Specific IS, 61 IS managers	Field	Overall satisfaction
Mahmood & Becker(1985-1986)	Overall IS, 59 firms 118 managers	Field	User satisfaction
Mahmood & Medewitz(1985)	DSS, 48 graduate students	Lab	User satisfaction (multi item scale)
McKeen(1983)	Application systems, 5 organisations	Field	Satisfaction with development project(Powers and Dickson instrument)
Rivard & Huff(1984)	User-developed applications, 10 large companies	Field	User complaints regarding information centre services
Doll & Torkzadeh(1988)	-----	Field	Ease of use and information product items

Perceived user satisfaction was measured using the Seddon and Yip (1992) instrument which found the EUCS instrument outperformed the UIS instrument in the context of accounting IS. In their study, Seddon and Kiew (1994) tested this instrument's reliability; coefficient (alpha) was 0.91. In the current study, this four question instrument was used to operationalise the user satisfaction variable. In this 5 point-Likert scale, the respondents were asked about their perception of the IS effectiveness, IS efficiency, if the IS met their area of responsibility and their overall satisfaction with the system (Table 4.8). However, some changes were made to the original instrument, for example the original scale included two choices for each item and for example the answers were Adequate / Inadequate. So it was seen that keeping the original as it was would make the scale confusing and difficult to understand. Therefore, it was decided to make one single answer, ranging from "strongly agree" to "strongly disagree".

Individual Impacts

Individual impact examines the effect of the IS on the users' performance (DeLone & McLean, 1992). Individual impact has been measured in various ways, including decision effectiveness (Meador, Guyote & Keen, 1984), user productivity (Rivard & Huff, 1984), estimated value of the IS (Cerullo, 1980) and estimated dollar value of the information received (Gallagher, 1974; Keen, 1981). However, perceived usefulness or job impact is the most common measure at the individual level (Peter et al., 2008).

Millman and Hartwick (1987) used a questionnaire to assess the impact of the office automation on middle management. Managers were asked whether office automation increased, decreased or had no effect on 15 different aspects of these managers' jobs and work (importance of job, amount of work required on the job, accuracy demand on the job, skill needed on the job, interesting job).

Doll and Torkzadeh (1998) used 12 items to test the impact of IT on task productivity,

task innovation, customer satisfaction and management control. Doll and Torkzadeh (1999) validated the same 12 items for the purpose of developing an instrument for measuring the impact of IT on work. The reliability scores were 0.93, 0.95, 0.96 and 0.93 for task productivity, task innovation, customer satisfaction and management control, respectively. The overall reliability for the instrument was 0.92. Table 4.7 summarises the empirical measures of individual impacts.

Table 4.7 Measures of individual impacts

Author	Description of study	Type	Description of measures
Zmud(1983)	External information channels	Field	Recognition and use of modern software practices
Srinivasan(1985)	Computer-based modelling systems:29 firms	Field	1. Problem identification 2. Generation of alternatives
Rivard & Huff(1985)	User-developed IS, 10 firms 272 users	Field	Productivity improvement
Rivard& Huff(1984)	User-developed application 10 large companies	Field	User productivity
Luzi & Mackenzie (1982)	Performance IS, 1 university, 200 business students	Lab	1. Time to solve problem 2. Accuracy of problem solution 3. Efficiency of effort
Kasper(1985)	DSS, 40 graduate students	Lab	Ability to forecast firm performance
King & Rodrigus (1981)	Strategic system, 1 university, 45 managers	Lab	1. Worth of IS 2. Quality of policy decisions
Lucas(1981)	Inventory ordering system 1 university, 100 executives	Lab	User understanding of inventory problems
Millman & Hartwick	Assessing impact of office automation on middle		Effect of increase/decrease office automation on importance of job,

(1987)	management	Field	interesting job...etc
Doll and Torkzadeh(1998)	-----	Field	Impact of IT on task productivity, task innovation, customer satisfaction and management control

The Torkzadeh and Doll (1999) instrument was used to operationalise the individual impact variable in this study (Table 4.8) on a four-dimensional basis, individual impact on task productivity, task innovation, customer satisfaction and management control. However, only 10 out of the 12 items were used. As for the impact on task innovation, there were three items: “IS helps to create new ideas”, “IS helps to come up with new ideas” and “IS helps to try out innovative ideas”. However, it was realised from the pilot study that these three items could be difficult for respondents to differentiate as they seem quite similar. Therefore, it was decided to drop two items and keep one which was “IS helps try out innovative ideas”.

To conclude, Table 4.8 presents the different measurement instruments for the variables of the research model used in the questionnaires (See Appendix A: English version of questionnaire).

Table 4.8 Measurement instruments of study variables

Variable	No. of Items/ Constructs	Construct's name	Questionnaire items
Age	1	L	1. What is your age?
Education level	1	M	2. What is your education?
Length of system use	1	P	3. How many years have you been working with information systems?
System Quality	7	A1	4. It is difficult for me to use the capability of the information system

		A2	5.Information system provided can be highly trusted
		A3	6.Information system is flexible and can change in response to new demands
		A4	7.Reply to user's demand for service from information systems is fast
		A5	8.Ability of the information system to transmit data between different functional departments within my organisation is high
		A6	9.Relative balance between costs and benefits of the information system is positive
		A7	10.Wording and vocabulary used to interact with the information system are easy to use
Information Quality	9	B1	11.There is a lot of redundancy in the amount of information conveyed to me
		B2	12.Dependability of output information is sufficient for me to do my job
		B3	13.Content of output information is sufficiently comprehensive
		B4	14.Output information from the information system is adequately correct for my purposes
		B5	15.There is consistency between actual output information in general and information that should be produced by the information system
		B6	16.Output information is current and up to date
		B7	17.Format and layout of the information are readable
		B8	18.Information system provides information when I need it
		B9	19.There is a high degree of congruence between what I require from the information system and what is provided
Service Quality	24	C1	20. IS department has up to date hardware
		C2	21. IS department has up to date software
		C3	22. IS's physical facilities are visually appealing
		C4	23. IS department employees are well dressed and neat in appearance
		C5	24. Appearance of the physical facilities of the IS department is in keeping with the kind of service provided

		C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24	25. When the IS department promises to do something by a certain time, it does so 26. When users have a problem, the IS department is committed to solving it 27. IS department is dependable 28. IS department provides its services at the time it promises 29. IS department insists on providing error-free records 30. IS department will tell users exactly when services will be performed 31. IS department employees give prompt service to users 32. IS department employees are always be willing to help users 33. IS department employees are never too busy to respond to user requests 34. Behaviour of IS department employees instils confidence in users 35. Users feel safe in their transactions with IS department employees 36. IS department employees are consistently courteous with users 37. IS department employees have the knowledge to do their job well 38. IS department gives users individual attention 39. IS department has operating hours convenient to all its users 40. IS department has employees who give users personal attention 41. IS department has the users' best interests at heart 42. Employees of IS department understand the specific needs of its users 43. The quality of service provided by the IS department is excellent
Training	3	D1 D2	44. When you first used the information system in your department, how much training did you receive? 45. When the information system was first used in your department, did you receive: 1. On-site training 2. Off-site training

		D3	46. When the information system was first used in my department, I felt completely prepared for it
User Involvement	1	E1	47. Users are fully involved in the design of new information systems
Top Management Support	7	F1	48. Top management involvement with information systems is strong
		F2	49. Top management is interested in information systems
		F3	50. Top management understands the importance of information systems
		F4	51. Top management supports the information systems
		F5	52. Top management considers information systems as a strategic resource
		F6	53. Top management understands information systems opportunities
		F7	54. Top management keeps the pressure on operating units to work with information systems
System Usage	4	G1	55. On an average working day when you use a computer, how many hours do you spend on the information system?
		G2	56. On average, how frequently do you use the information system?
		G3	57. With respect to the requirements of your current job, please indicate to what extent you use the information system to perform the following tasks
		G4	58. With respect to the requirements of your current job, please indicate which information system packages you use
User Satisfaction	4	H1	59. Information system fully meets the information needs of my area of responsibility
		H2	60. Information system is efficient
		H3	

		H4	61.Information system is effective 62.Overall, I am satisfied with the information system
Individual Impact	10	I1 I2 I3 I4 I5 I6 I7 I8 I9 I10	63.Information system permits me to accomplish a great deal more work than otherwise would be possible 64.Information system applications save time 65.Information system increases productivity 66.Information system helps me to try out innovative ideas 67.Information system helps me to meet customer needs 67. Information system improves customer service 68. Information system provides customer satisfaction 69. Information system improves management control on the work process 70. Information system helps management to control performance and correct errors 71.Information system enables management to ensure timely completion of tasks

Note that in addition to gathering information regarding the core variables in the model, the questionnaire survey contained items thought to be useful for further descriptive data analysis. Additional items were included to capture:

- Gender
- Organisational level
- Tenure in the current job, bank and banking industry

4.11 Research sampling design

For non-experimental research, there are two major sampling types: probability and non-probability sampling. In probability sampling, elements have a known chance of being selected as subjects in the research. In non-probability sampling, elements do not have a predetermined chance of being selected. Time, type of information needed, availability and generalisability are the main determinants in selecting the sampling technique. If generalisability is the important issue then probability sampling should be used. In instances where time rather than generalisability is the important issue, non-probability sampling is used. Also, when the information needed in the research could be obtained from specific targets, then non-probability sampling is used. The same also applies when the only sources of information are specific elements.

- **Probability sampling**

Probability sampling has different techniques such as simple random, systematic random, stratified random, cluster sampling and multi-stage sampling.

- **Non-probability sampling**

Non-probability sampling also has many techniques such as convenience sampling, purposive judgement, snowball sampling, quota sampling, dimensional sampling and natural sampling.

- **Other types of sample**

There are some other types of sample used for special purposes, including (Robson, 2002) time, homogeneous, heterogeneous, extreme case and rare element samples. The main purpose of sampling is to select a small number of cases (e.g. people, households, organisations); the sample should be assembled in such a way as to be representative of the population from which it is taken (Malhotra, 2004). A major consideration in using

the questionnaire is to determine which subjects should be surveyed, so as to obtain the appropriate information for the research problem (Malhotra, 2004).

A target population is the one at which the proposed project is directed. Mark (1996) defines population as the collection of all individuals, families, groups, organisations, communities and events about which researchers are interested in finding out more.

Bless and Higson-Smith (1995) indicated that the first ways of ensuring a representative sample is the use of a complete and correct sampling frame, which is the list of all units from which the sample is to be drawn. A sampling frame looks like a register containing a list of all the names of, for example, houses in a street, trees in an area and shops in a town. Defining the sample frame is important as it is a major determinant of the extent to which a sample is representative of the population under study. There are two main considerations for a sample: the adequacy of sample size for generalisability and for statistical testing (Hair et al., 1998). Thus, Hair et al. (1998) stated “*While sample sizes as small as 50 have been used, a large sample size is recommended*” (p.12).

The primary data analysis technique for this study is structural equation modelling (SEM) using partial Least Square (PLS). Henseler et al. (2008) indicated that approximately 10 cases per measured item in a PLS-like model are appropriate.

In this study, the population was all bank managers in Egypt. However, it was difficult to cover the whole population. So a convenience sample technique was used to find available bank managers to be included in this sample. This technique is often used to build a sample on the basis of finding convenient or available individuals and those who are selected are those who are close at hand. However, it has been argued that convenience sampling can cause bias that may undermine the representativeness of the sample (Ruane, 2005). However, every effort was made in this study to ensure that that

this is not the case. This was done by trying to cover all types of banks, all functional managers within these banks and all geographical areas in Cairo and Alexandria cities.

The total of banks in Egypt is 41; total branches were 3000, of which 1037 were branches in villages (Monthly Statistical Bulletin, 2007).

Thus, the present study population consisted potentially of all bank managers in Egyptian banks who were using computer-based IS to support them in their work.

The unit of analysis was the end-user of the computer-based IS in banking organisations (manager). Thorough assessments of a multidimensional model such as the one proposed would necessitate a lengthy and intensive project. However, due to time (3 years) and money constraints and to facilitate this study and keep it manageable, the selection of the banks was restricted to two main geographical areas, the cities of Cairo and Alexandria. As the former is the capital of Egypt and the latter is the second biggest city after Cairo and most of the banks and bank branches are in these two cities. Therefore, they were good representatives of the Egyptian banking industry.

25 banks and primary bank branches were selected by using a convenience sampling technique and all branch managers, general managers, department managers and division managers in those banks were selected to be the research subjects. Different types of banks were included in the sample (public banks, private banks, joint venture banks, Islamic banks and branches of foreign banks) and different functional specialisations (e.g. savings account, foreign accounts, public accounts and credit accounts) were also included.

There was one branch manager, between four to six general managers, between nine to ten department managers and between twelve to fifteen division managers in each bank. The total number of managers in the 25 banks at all levels was approximately 800.

Those banks were selected according to the following criteria:

1. ISs were in use in banks for at least three years to ensure that the system was used for a long enough time to be understood and for the managers to have got used to it.
2. ISs applications covered the basic functional areas in the banks (e.g. saving accounts, public accounts, credit and debit cards, credit accounts, foreign accounts) as the selected bank managers were from different functional areas of those banks in order to ensure that all the managers had the chance to use the system and judge it.
3. Banks were willing to take part in the research as some declined. As few banks (about 6) declined and indicated that their policies restrict any employees and managers from participating in any surveys and/or giving any information or opinions about any bank-related issues.

In each bank, the questionnaires were distributed to the end users (branch, general, department and division managers). The data were collected from mid-December 2007 to mid-March 2008 from the following banks and bank branches:

- **Public banks** National Bank of Egypt (three branches), Cairo Bank (two), Bank Misr (two), Industrial Development Bank of Egypt (one)
- **Private and joint-venture banks** Alexandria Bank (two branches) , Cairo Barclays Bank (one), National Societe General Bank (one), Al Watany Bank of Egypt (one), Audi Bank S.A.E. (one), Ahli United Bank- Egypt (one), Suez Canal Bank (one), Commercial International Bank (Egypt) S.A.E. (one), Blom Bank- Egypt (one), Egyptian Gulf Bank (one), National Bank for Development (two), Housing and Development Bank (one).
- **Islamic banks** Faisal Islamic Bank of Egypt (one branch)
- **Branches of Foreign Banks** HSBC Egypt (two branches)

After identifying the 25 banks, the necessary approvals to conduct the study were obtained. This included approval from the Egyptian Ministry of High Education, Alexandria University (researcher's sponsor) and the Business Administration Department at the School of Commerce, Alexandria University. Then, letters from Alexandria University were hand delivered to the management in each of the 25 banks. During the meeting with the management, the goal and importance of this study were explained (see Appendices D and E: Letters from Alexandria University to the banks).

All 25 banks agreed to participate, and they provided the support to facilitate the data collection. The management in each bank issued a letter to the HR departments in which they provided a list of the names of their general, division and department managers who used ISs in their divisions, departments and work. The following criteria were used to determine the sample participants:

- Division/ department managers directly using an IS application in their work.
- Branch/general managers directly or indirectly (output) using an IS.
- Willingness of managers themselves to participate in the study was used also as one of the criteria of determining the subjects, as there were a few bank managers unwilling to take part and refused to complete the survey.

The total number of distributed questionnaires was 580. In the first wave of distribution, 500 questionnaires were distributed to 19 banks. In the second wave, 80 were distributed to the remaining 6. Table 4.9 shows the sample distribution by organisational levels.

Table 4.9 Sample distribution by organisational level

Organisational level	Number	Percentage%
Branch managers	25	10%
General managers	62	24%
Department managers	75	29%
Division managers	95	37%
Total	257	100%

4.12 General outline plan for questionnaire survey data analysis

This study had two different sets of data. Firstly, the telephone interviews and secondly, the questionnaire survey. The telephone interviews process was discussed in detail in section 4.4, in which an analysis of interviews was presented. As for the questionnaire survey, four separate statistical techniques were used to analyse the data. First, descriptive statistics to show the distribution of responses, analysis of variance (ANOVA), correlation analysis and structural equation modelling (SEM) using PLS (Partial Least Square) technique. Each of these methods is briefly discussed.

- **Descriptive statistics**

Descriptive statistics is the branch of statistics which deals with ways of organising and summarising possibly large collections of experimental measurements in order to obtain one or more meaningful values which summarise the major characteristics of the data (Nachmias & Nachmias, 2000). Summary properties, such as averages and percentages, were used in the study for reporting the characteristics of the surveyed respondents and simultaneously providing adequate statistical support to the findings. Tables were used to demonstrate the findings, as well as numerical summaries of specific aspects of the data for more complete description.

- **Analysis of Variance**

Analysis of variance (ANOVA) provides methods for simultaneously comparing the differences among the means of more than two populations. The reason for the word

“variance” in analysis of variance is that the procedure for comparing the means involves analysing the variations in the sample data (Weiss, 1995). One–Way ANOVA was used to test the differences among the means of demographic variables.

- **Correlation Analysis**

The Kruskal-Wallis test is a nonparametric procedure for a hypothesis test to compare the means (or medians) of several populations with the same shape. It applies when the populations have the same shape, but it does not require that they be normal or has any other specific shape. In other words, if the populations being sampled have the same shape but are not normally distributed, then the Kruskal-Wallis test is usually more powerful than the one-way ANOVA test (Weiss, 1995). Pearson’s correlation, Spearman correlation analysis and Mann-Whitney test were used to analyse the demographic variables before running the PLS technique.

- **Structural Equation Modelling**

Structural equation modelling (SEM) was used in this study. The aim of SEM is to understand the structure among several variables (Hoyle, 1995). This study selected it to test hypotheses, because it is recognised as a more comprehensive and flexible approach to research design and data analysis than any other single statistical model in standard use by social researchers (Hoyle, 1995).

The research proposed model was tested by using PLS-Graph (Partial Least Square). Path-modelling tool is well cited for highly complex predictive path models (Bradley et al., 2006). PLS-Graph has several strengths to make it appropriate for this study, including its minimal demands on measurements scales, sample size and residual distribution (Prybutok et al., 2008). However, it is important to obtain at least an appropriate sample size to produce reliable results (Prybutok et al., 2008).

4.13 Summary

Chapter 5 presented the research methodology adopted for this study. Firstly, it introduced the epistemological approach, different types of research design, which can be generally placed into three categories: historical, experimental and non-experimental design. It also presented research process, respondent population and sampling. The chapter presented the operationalisation process for the variables of the model to be tested in the study and concluded by presenting the outline plan of data analysis.

Chapter 6 presents the results of preliminary analysis of data collected and the results of Structural Equation Model (SEM) using PLS analysis.

Chapter 5

Data Analysis

5.1 Introduction

This chapter details the analysis of data collected during the study by questionnaire survey. This chapter begins with an overview of the sample characteristics, methods and procedures for testing the hypotheses in the research model. The next section presents an overview of the SEM technique, which actually encompasses a variety of analysis techniques. Following that, a justification for the use of SEM and especially the Partial Least Square (PLS) technique is presented. This is followed by the presentation and analysis of the measurement models used in the study and finally, the structural models are presented.

5.2 Respondents' characteristics

This section presents the first step of the data analysis, that is, descriptive statistics of the study sample. Tables 5.1 and 5.2 present a profile of the survey respondents with regard to major demographic characteristics of gender, age and education and professional characteristics of length of service in the banking industry, length of service in the current bank, length of service in current job and length of system use.

5.2.1 Gender, Age and Education

67.3% of the respondents were male and 32.7% were female (see Table 5.1) which gives an indication that most of the administrative jobs are allocated to males. Almost half of the respondents (48.2%) were 50 and over. It is noticed that the average age of the managers was 40. Since 48.2% of the sample was 50 and over and 31.1% of the sample were 40 to 49, then almost 80% of the sample were more than the average age of the sample, which give an indication that banking managers' positions were allocated to (or filled by) older rather than young employees.

As for the educational level, the respondents were asked to provide their highest level of formal educational qualifications which varied from high school (0.4%) to Master degree (4.7%); however, most of the subjects (91%) had a Bachelor degree. The age and educational level indicate that, as we go higher in the banking hierarchy, the age and educational levels increase. Table 5.1 presents the respondents' personal characteristics' profile.

Table 5.1 Respondents' personal characteristics

Characteristic	Value	Frequency	Percentage
Gender	Male	173	67.3
	Female	84	32.7
Age	under 20	1	0.4
	20 to 29	14	5.5
	30 to 39	38	14.8
	40 to 49	80	31.1
	50 and over	124	48.2
Education	below high school	0	0
	high school	1	0.4
	high school and some college	10	3.9
	bachelor	234	91
	master	12	4.7
	doctorate	0	0
Total respondents		257	

5.2.2 Professional characteristics

- **Length of service in banking industry, current bank, current job and length of system use**

The sample professional characteristics were length of service in banking industry, current bank, current job and duration of system use. The intervals used in this study were 5 years, as suggested by some prior research (e.g. Almutairi, 2001). Table 5.2 presents the job titles of respondents.

Table 5.2 Job titles

Job title	Number	Percentage
Branch manager	25	10
General manager	62	24
Department manager	75	29
Division manager	95	37
Total	257	100

Table 5.3 presents the professional characteristics profile of respondents.

Table 5.3 Professional characteristics

Characteristic	Years	Frequency	Percentage
Years of service in Egyptian banking industry	< 1	5	1.9
	1 to 5	10	3.9
	6 to 10	8	3.1
	11 to 15	47	18.3
	16 to 20	73	28.4
	21 to 25	59	23
	> 26	55	21.4
Years of service in current bank	< 1	8	3.1
	1 to 5	12	4.7
	6 to 10	8	3.1
	11 to 15	44	17.1
	16 to 20	72	28
	21 to 25	58	22.6
	> 26	55	21.4
Years of service in current job	1 to 5	198	77
	6 to 11	34	13
	12 to 20	25	.10
length of BIS use	1 to 5	71	28
	6 to 10	94	37
	11 to 15	65	25
	16 to 20	27	10
Total respondents		257	

As indicated in Table 5. 3, 28.4% of the respondents had been employed in the Egyptian banking industry for between 16 to 20 years, 23% for between 21 to 25, 21.4% for more than 26 and 18.3% for between 11 to 15 years. This indicates that respondents had a long banking career (approximately 73% of the respondents had between 16 and 26 years of service in the industry).

It is noticed that 28% of the respondents had been employed in their current bank for 16 to 20 years, 22.6% for 21 to 25 years, 21.4% for more than 26 years, and 17.1 % for 11 to 15 years.

77% of the respondents had been employed in their jobs for between 1 to 5 years, 13% for between 6 to 11 and 10% for 12 to 20 years. It is noticed that 28% of the sample had been employed in their current bank for 16 to 20 years. Therefore, we may conclude that most of the respondents have been moved from one job to another during their work in the same bank.

As for the length of BIS use, 37% of respondents had between 6 to 10 years' experience. The second largest group (28%) had between 1 to 5 years' experience. Several respondents (25%) had between 11 to 15. However, only 10% had between 16 to 20 years. It is noticed there was a big difference between the minimum and maximum of length of BIS use. Central Bank of Egypt (CBE) did not implement BIS at the time in all banks and all banks' branches as each bank has its information policies and rules which give all banks (public, private, joint venture and Islamic banks) the responsibility to determine the type of BIS required and time and level of implementation (CBE, 2007). These differences in the dates of applying computer-based BIS within the same branch of the bank and between different branches of different banks could be the reason for the gap between the minimum and maximum levels of BIS length of use.

Therefore, from these statistics, we can conclude that the length of banking career and the years of service in the current bank, current job and length of BIS use indicate that bank managers in the sample have sufficient background (in terms of being able to judge the technical system quality, the quality of IS outputs and the quality of provided IS department' services) and good experience with ISs in their banks which enable them to evaluate the different dimensions of ISs.

- **Received IS training level and user involvement**

The second group of professional characteristics are level of received IS training and level of user involvement in the design of ISs. Table 5.4 presents the profile of training levels and user involvement.

Table 5.4 Training level and user involvement

Characteristic	Value	Frequency	Percentage
Training 1 Q.49 (When you first used IS in your department, how much training did you receive?)	1(no training)	9	3.5
	2(some training but inadequate)	167	65
	3(adequate training)	81	31.5
Training 2 Q.50 (When you first used the IS, did you receive?)	1(on-site training)	233	90.7
	2(off-site training)	24	9.3
Training 3 Q.51 (When you first used the IS, did you feel completely prepared for it?)	1(strongly agree)	1	.4
	2(agree)	22	8.5
	3(no opinion)	16	6.2
	4(disagree)	187	72.8
	5(strongly disagree)	31	12.1
User involvement Q.52 (Users are fully involved in the design of new IS?)	1(strongly agree)	26	10.1
	2(agree)	73	28.4
	3(no opinion)	90	35
	4(disagree)	63	24.5
	5(strongly disagree)	5	2
Total respondents		257	

As indicated in Table 5.4, 65% of respondents received some but inadequate training (from their perspectives) to enable them to use the IS effectively and in some banks training was given once when the bank started to use new applications in the bank branches and, after that, the bank depended on older managers and employees to teach their experience to the new managers and employees, particularly when the new application had similar features to the old one, while 31.5% of the respondents received adequate training to enable them to use the system effectively (as in the case of HSBC bank branches and some private banks) and 3.5% of the managers did not receive any IS training beforehand.

However, some managers explained (in some informal interviews during the questionnaire distribution process) that the reason for the low level of formal off-site training may be due to the continuous assistance they received from the IS department and its staff. In addition, 90.7% of the managers received their training on-site in the bank buildings and 9.3% off-site outside the bank buildings. On the other hand, 72.8% of the respondents felt they were unprepared when the IS was first used in their departments. This indicates that received levels of IS training were not as high as they should be in terms of quantity (some training but inadequate) and quality (respondents felt unprepared for the IS when it was first used).

As for the level of user involvement in the design of ISs, Table 5.4 indicates that 28.4% of the respondents' opinions agreed that users were fully involved in the design of new ISs, while 24.5% disagreed and 35% had no opinions.

Perhaps the 35% who had no opinion on user involvement is an unexpected result as it means that bank managers were not able to decide if IS users were involved in the IS design or not. Some bank managers were a little cautious regarding some questions or discussing some bank issues that they may consider of a political nature. As users' involvement in ISs' design was seen by some managers as a top management issue "*It is the top management role to make these decisions*", as recognised by one respondent), and although assuring anonymity to all participants, the bank managers may have preferred the safe side by not agreeing or disagreeing on users' involvement in ISs' design.

We can conclude from these statistics that users were involved to some degree. However, despite the percentage of managers who thought users had been involved in IS design (28.4%) is higher than those who thought the opposite (24.5%), the difference in the two percentages (3.9%) is not big enough to assert that users are highly involved

in IS design in the banking sector. Therefore there is an indication of the lack of users' involvement in the designing of new ISs, which means that bank management may not have perceived the importance of users' participation, feedback and involvement in designing and implementing ISs which will finally provide those users with their information needs.

5.3 Revised proposed model and research hypothesis

The IS literature review and the IS professionals' interviews provided input and direction for the final review which, in turn, drove the creation of the conceptual research model in Figure 4.1 and associated hypotheses presented in Chapter 4. However, some descriptive statistics' being produced, the profiles of the data and frequencies statistics are also presented.

Regarding the system usage variable, several researchers have dealt with this as a multi-dimensional concept (e.g. Igbaria, 1992; Igbaria et al., 1989; Kim & Lee, 1986). The dimensions these researchers identified included, for example, actual daily use, frequency of use, level of sophistication of use, number of packages used and inclusion of computer analysis in decision-making as measured by the number of tasks in which the system is used. However, system usage was measured in this study by a four-item scale (Igbaria et al., 1989). The respondents were asked about their average working hours on ISs, their average frequency of use, the tasks they use them for and, finally, the IS packages they used. Table 5.5 presents system usage profile.

Table 5.5 System usage

Characteristic	Value	Frequency	Percentage
Actual daily use Q.60	1(less than30 minutes)	7	2.7
	2(more than 30 minutes to 1 hour)	9	3.5
	3(more than 1 to 2 hours)	22	8.6
	4(more than 2 to 3 hours)	27	10.5
	5(more than 3 hours)	192	74.7
Frequency of use Q.61	2(once a month)	2	.8
	3(few times a month)	8	3.1

	4(few times a week)	18	7
	5(about once a day)	229	89.1
Total respondents		257	

It was found that 74.7% of respondents spent more than three hours working on ISs daily, taking into consideration that total working hours in Egyptian banks are six hours daily from 9 am to 3 pm. Also, 89.1% of managers used ISs once a day. Therefore we can conclude that most of the respondents were heavy users of ISs either by number of hours spent on using ISs or by frequency of usage.

Accordingly, supported by the statistical evidence, there was not much variability between the respondents in either actual daily use or in frequency of use. Therefore the respondents who were heavy users of the ISs and those who were not were dropped. So it was decided to drop the system usage variable from the proposed research model in order to avoid further complicating the investigation and analysis of the model. Hence, the revised proposed model, without system usage, would be applicable for heavy users of ISs.

- **Number of tasks in using system**

Regarding the tasks performed using ISs, the respondents were asked about the extent to which they use the IS to perform the tasks and activities mentioned in Table 5.6.

Table 5.6 Number of tasks performed

Tasks (Q.62)	Frequency	Percentage
Controlling and guiding activities	170	66.1
Communicating with others	168	65.4
Budgeting	166	64.6
Finding problems	156	60.7
Making decisions	152	59.1
Looking for trends of historical reference	150	58.4
Planning	136	52.9
Others, please specify	0	0

It is noticed in Table 5.6 that BISs are highly used in different tasks and activities, which implies the importance of ISs in the Egyptian banking industry. However, the level of ISs' usage was different from one task or activity to another and this could be due to the different levels of bank managers and their different functional areas of responsibilities. Therefore we can conclude that controlling and guiding activities and communicating with others were the most two important tasks for which ISs were used; on the other hand, planning was the least important task ISs were used for in Egyptian banks.

- **Number of packages used**

As indicated in Table 5.7, the respondents were asked about the computer packages for which they used IS.

Table 5.7 Profile of number of packages used

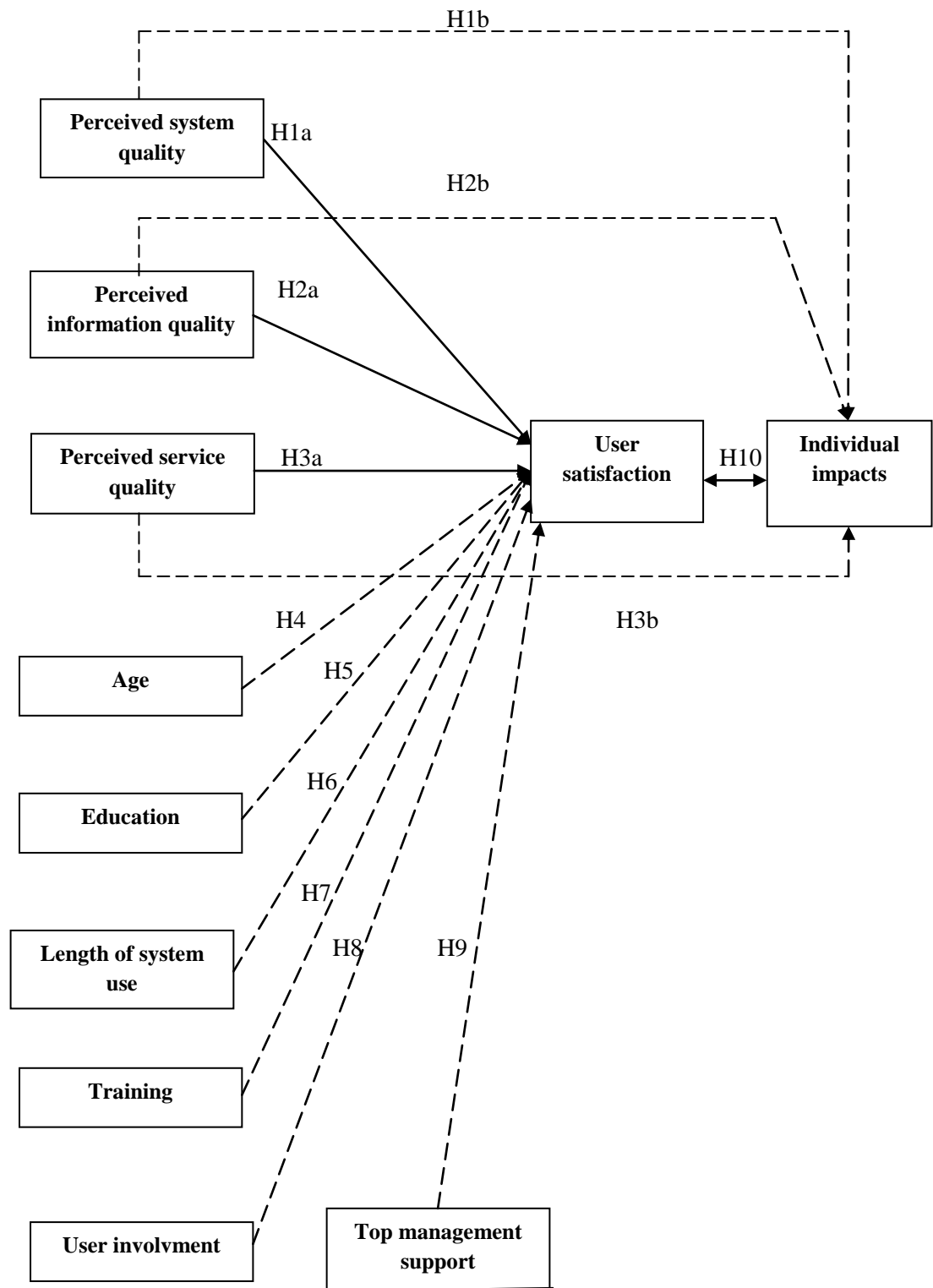
Packages (Q.63)	Frequency	Percentage
Spreadsheets	160	62.3
Statistical systems	125	48.6
Own programming	124	48.2
Data management packages	98	38.1
4GL	68	26.5
Modelling systems	61	23.7
Communication packages	50	19.5
Word processing	35	13.6
Graphical packages	12	4.7
Others, please specify	0	0

It is shown that spreadsheets and statistical systems were the most two important computer packages for which ISs were used, while graphics packages were least computer packages least used in ISs. It is also noticed that despite communications with others as one of the top two activities or tasks performed using IS, the use of ISs in computer communication packages was low (19.5%).

Implications of descriptive statistics for research model

The implications of the results of descriptive statistics analysis (frequencies) of the study model for modifying the relationships in the research model and its associated hypotheses are presented. Figure 5.1 shows the final revision of the proposed research model of the study with labelled hypotheses.

Figure 5.1 Final research model



Based on the outcome of descriptive statistics analysis, system usage was dropped from the proposed model. The research hypotheses are expected to be changed to reflect the change in the variables and relationships in the research model.

5.4 Analysis of demographic variables

The questionnaire survey instrument was divided into nine sections with the first dealing with demographics. Some of the demographics were included in the proposed conceptual model of the study, e.g. age, educational level, length of BIS use. However, some additional demographic data were collected for descriptive analysis. These data included gender and length of service in the banking industry, in the current bank and in the current job.

Before SEM for the whole sample (257 respondents) to examine the relationships between the variables and to test the hypotheses, an analysis of some of the demographics had to be done. Since system usage was dropped from the research model, the main purpose of the analysis was to make sure that there were no differences or variations between various categories of these demographics and the user satisfaction variable only. If there were differences in any of these demographics categories, a separate SEM analysis would be done for each. Therefore, this analysis was important to determine how many groups or categories to include in the SEM analysis.

The demographic variables analysed are the variables included in the proposed research model only: age, educational level and length of system use. However, despite gender's not being part of the proposed research model, the Mann-Whitney test was used to analyse it in order to have a clearer picture of the demographic characteristics of the sample. The following section presents the results of the demographics analysis.

- **Age**

One-way ANOVA was used to compare between the means of age and user satisfaction. Age was measured by using intervals from under 20 to 50 and more. The age frequencies were as follows (Table 5.8):

Table 5.8 Age profile

Age	Frequency	Percentage
Under 20	1	.4
20 to 29	14	5.5
30 to 39	38	14.8
40 to 49	80	31.1
50 and over	124	48.2
Total	257	100

Table 5.8 shows that the first and second categories represented the age group of under 20 up to 29, so they were merged together in one group. Therefore, there were four age categories, as follows: category 1 = 15 respondents, category 2 = 38, category 3 = 80 and category 4 = 124.

The one-way ANOVA analysis in the four age group categories indicated significant differences between the four groups of age and user satisfaction. However, the differences between the first and second age groups were smaller than those between the other two groups and because SEM analysis could be applied on the first or second group separately because of their small sizes (15 and 38 respondents). The first and second categories were thus merged to represent the age category under 20 up to 39, with 53 respondents. On the other hand, the other two groups (the third and fourth groups) were kept as they were. Therefore, the age analysis revealed three age categories which have differences or variations between them in terms of their relationship with user satisfaction. This means that these three groups will be included in three SEM models.

- **Educational level**

One-way ANOVA enables comparison of means of education level and user satisfaction. ANOVA is used to compare the means of several normally distributed populations having equal standard deviations, using independent samples. However, if the populations being sampled have equal standard deviation, then they have the same

shape; if they are not normally distributed, then the Kruskal-Wallis test is usually more powerful than one-way ANOVA. For this study, and because the sample was not normally distributed, both one-way ANOVA and the Kruskal-Wallis tests were used. Education level was measured using seven intervals from less than high school to doctorate. The frequencies of education level were as follows (Table 5.9):

Table 5.9 Educational level

Educational level	Frequency	Percentage
less than high school	0	0
high school	1	.04
high school and some college	10	3.9
bachelor	234	91
master	12	4.7
doctorate	0	0
Total	257	100

It is noticed that the second and third categories represented the less educated group in the sample (high school, high school and some college), so they were combined into one group of eleven respondents. The next group of 234 respondents was the dominant group which represented bachelor degree holders; the third group with 12 respondents, represented managers with a master's degree. However, by using principal component factor analysis on a multi-dimensional basis, with all user satisfaction items together, there were no overall differences between the three groups of educational level ($p = 0.227$). The Kruskal-Wallis test was also used to compare the median of educational level with user satisfaction. The results indicated that there were no differences between educational level and user satisfaction ($p = 0.027$, adj: ties $p = 0.169$). Additionally, one-way ANOVA was used on an individual basis on each item of user satisfaction separately to compare between the means of these three groups and user satisfaction. The results indicated that there were differences between the first group (11 subjects) and the other two groups with all user satisfaction items. On the other hand, there were no differences between the second and third groups. However, it was not possible to

make a separate SEM model for only eleven respondents, therefore this less educated group was dropped from the analysis and the second and third groups were retained. This means that the model would be applicable only to educated groups (bachelor degree and more). As for the remaining two groups, there were no differences between them and all items of user satisfaction, thus there was no need to make a separate SEM model based on formal level of educational.

- **Length of system use**

Correlation analysis (Spearman) was used to test if there are any relationships between length of system use and user satisfaction. Correlation analysis is one of the most commonly used statistics to measure the correlation between two variables. The linear correlation coefficient is a descriptive measure of the strength of the linear relationship (straight-line) between two variables. The results indicated that the relationship between length of system use and user satisfaction is not significant for the following: length of system use with H1 (The BIS fully meets the information needs of my area of responsibility) is not significant ($p \leq 0.58$) and H4 (Overall, I am satisfied with the BIS) is not significant ($p = 0.22$). However, the relationships between length of system use and H2 and H3 were as follows: H2 (The BIS is efficient) is very weakly significant ($R^2 = 0.0144$, $p \leq 0.005$), H3 (The BIS is effective) significant ($R^2 = 0.065$, $p \leq 0.005$). These statistics mean that for H3, was about perceived IS effectiveness, there were differences between IS users which could be due to their length of system use. That means that the more time the managers used the system, the more likely they perceived the system as effective.

- **Gender**

Mann-Whitney test was used to compare the means of the two gender groups in relation to the user satisfaction variable. The Mann-Whitney test is a nonparametric test applied when the populations have the same shape, but does not require that they be normal or have any other specific shape. User satisfaction was divided into four items (H1, H2, H3 and H4) (see Table 4.8, Chapter 4). The results of the test indicated that the relationship between gender and user satisfaction is not significant for the following: gender with H1 is not significant ($p = 0.397$), H2 is not significant ($p = 0.931$), H3 is not significant ($p = 0.232$), H4 is highly significant ($w = 21060.0$, $p = 0.001$). These statistics mean that for the first three items of user satisfaction, there is no variability in the means of males and females. Therefore, there were no differences between males and females in user satisfaction in terms of their perception of the IS's meeting their information needs, the perceived efficiency of the IS and the perceived effectiveness of the IS. However, in the fourth item of the user satisfaction variable about overall satisfaction with the system, results showed that there were significant differences between males and females which cannot be ignored and that females overall were dissatisfied with the IS.

This result could be explained in terms of prior research's having been conflicting on the gender differences, as computer usage has generally been viewed as a masculine activity (Gefen & Straub, 1997; Harrison & Rainer, 1992). Thus, lower knowledge acquisition on the IS by female managers could lead to a lesser degree of user satisfaction.

To summarise, from the previous analysis of demographic variables, we can conclude that significant differences were found in the relationships between age and user satisfaction. Therefore, the study sample was divided into three age groups as follows: group 1 = 53 respondents (less than 20 up to 39), group 2 = 80 respondents (40 up to

49), and group 3 = 124 respondents (50 and over). However, to make the study manageable and to avoid more complications for the study model, the differences in gender and length of system use will be left to further research. Therefore, SEM with PLS technique will be used with the three age groups and three PLS models will be applied in the next section.

5.5 Hypotheses' testing procedures

This section is devoted to outlining the analytical methods used to test the hypotheses in the model and the reasoning behind those decisions. For the demographic variables of age, education and length of BIS use, a correlation analysis was used. Regarding the other variables, SEM technique was used. One-way ANOVA was also used to identify the variances in some demographic variables before starting the SEM analysis.

5.5.1 Overview of SEM

Structural equation modelling (SEM) is gaining wide acceptance among researchers in social sciences (Bollen & Long, 1993; Kelloway, 1998; Henseler et al., 2008) and is used in this study to test the hypotheses and arrive at the final model. SEM is also known as an analysis of covariance structures or causal modelling (Arbuckle & Wothke, 1999). Like most multivariate techniques, SEM includes two kinds of variable, dependent and independent, which in SEM are also called 'endogenous' and 'exogenous', respectively.

SEM is considered as the second generation of a set of statistical analysis techniques that provide significant benefits over first generation techniques such as multiple regression, ANOVA and MANOVA (Gefen et al., 2000). Techniques such as multiple regression analysis had a basic weakness which is while there may be multiple independent variables in a given model, there can only be a single dependent variable.

That meant that complex and multi-level models could only be assessed one level at a time. On the other hand, SEM allows evaluation of multiple relationships between many independent and dependent variables at the same time while incorporating the measurement error (Hair et al., 1998). This means that both direct and indirect effects of independent variables on dependent variables can be considered.

Although various forms of SEM have been developed, the majority express linear relationships between variables (Bacon, 1997). Hence, most of the assumptions of multiple regression, such as independent observations, linearity of all relationships and multivariate normality (Hair et al., 1998), apply to SEM as well. Structural equation models describe relationships between variables. In this respect, they are similar to combining multiple regression and confirmatory factor analysis and also encompass covariance structure analysis and latent variable analysis (Bacon, 1997). SEM has become an important data analysis method in the IS field. Based on a review of top IS journals, Gefen et al. (2000) found that 18% of articles submitted between 1994 and 1997 used some form of SEM. However, SEM offers some additional advantages over these techniques, which are discussed in the following section.

5.5.2 Why SEM?

SEM is considered to be an appropriate technique for true theory testing and empirical model building (Bollen & Long, 1993). It is useful in the estimation of multiple and interrelated dependence relationships (Fornell & Larcker, 1981). It also has the ability to represent unobserved concepts in these relationships and account for measurement error in the estimation process (Hair et al., 1998). It allows for constructs to be represented by several measures, thus providing the researcher with a more realistic and valid means of construct operationalisation. Thus, it allows the researcher to identify the ‘true’ relationship after measurement error is accounted for. Since this current study involves

the estimation of multiple and interrelated dependence relationships, this analysis technique, being associated with certain advantages as discussed, was chosen over other multivariate techniques for model and hypothesis testing.

Hair et al. (1998) describe the process of SEM as developing a theoretically-based model, constructing a path diagram of causal relationships, converting the path diagram into a set of measurement and structural models and, finally, interpreting and modifying the model if theoretically justified. These steps were implemented in this study to arrive at the final model depicting significant relationships between variables, by which the hypotheses of the study would be tested.

Researchers (e.g. Gefen et al., 2000) acknowledged the possibilities of distinguishing between measurement and structural models and explicitly taking measurement errors into account. They furthermore distinguished between two families of SEM techniques: covariance-based (CBSEM), as represented by LISREL, and variance-based (VBSEM), of which partial least squares (PLS) path modelling is the most permanent representative. The choice of either PLS and CBSEM must be in line with the analytical goals of the underlying research. Failure to take account of this issue may result in the misuse of those techniques, as well as negative consequences in the interpretation of the empirical results (Henseler et al., 2008). In some situations, CBSEM is preferable; in others, PLS may be. Moreover, there may be situations where using CBSEM is desirable but unobtainable, for example due to violations in some key CBSEM assumptions (e.g. sample size, distribution and model identification); in such cases, PLS may provide a realistic alternative. In this study and because the sample size is relatively small (fewer than 200 observations in each model), as researchers (e.g. Boomsma & Hoogland, 2001) provided evidence that precise CBSEM, depending on the selected discrepancy function and the model complexity, requires several hundred or

even thousands of observations. On the other hand, the sample size can be considerably smaller in PLS path modelling as there can be more variables than observations (Tenenhaus et al., 2005). Therefore, PLS will be used to test the hypotheses and examine the proposed research models.

5.5.3 Why PLS path modelling?

PLS has been used by a growing number of researchers and is the method of choice for success factors' studies in a variety of disciplines (Albers, 2008). PLS is a family of alternating least squares algorithms, which extend principal component and canonical correlation analysis. It was designed by Herman Wold (1966, 1974, 1982 and 1985) for the analysis of high dimensional data and has undergone various extensions and modifications (Henseler et al., 2008).

Its increasing popularity within the research community could be explained from the characteristics of PLS path modelling which can be summarised as follows (Henseler et al., 2008):

- It enables the explicit estimation of the multiple item construct.
- It avoids small sample size problems as it can provide information about the appropriateness of indicators at sample size as low as 20 (Chin & Newsted, 1999) and can therefore be applied in some situations when other methods cannot.
- It can estimate very complex models (consisting of many latent and manifest variables) without leading to estimation problems (Wold, 1985).
- It has less stringent assumptions about the distribution of variables (it can be used when distributions are highly skewed) (Bagozzi, 1994).
- It can handle both reflective and formative measurement models.

PLS technique is often used in studies where the researcher is attempting to understand the nature of relationships between variables. PLS has the ability to generate path coefficients which are similar to those created in the structural model in SEM.

To conclude, PLS is a powerful statistical technique. However, in order to use this power, the objective of the research project must be aligned with the capabilities of the technique and the assumptions of the technique must be met in order to obtain accurate and reliable results. Finally, the methodology for the construction of the PLS model must be appropriate, which means that a conceptually sound prior model must be used and *post hoc* manipulation of the model must be avoided.

5.5.4 Stages in PLS path modelling

PLS path models are formally defined by two sets of linear equations: the inner model and the outer model. The inner model specifies the relationship between unobserved or latent variables, while the outer model specifies the relationship between a latent variable and its observed indicators or manifest variables. PLS path modelling includes two different kinds of operationalisation measurement models: reflective (Mode A) and formative (Mode B). The selection of a certain outer mode is subject to theoretical reasoning (Henseler et al., 2008).

The reflective mode has causal relationships from the latent to the manifest variables in its block. Thus each manifest variable in a certain measurement model is assumed to be generated as a linear function of its latent variables. However, the formative model has causal relationships from the manifest variables to the latent variables. The basic stages of the PLS path modelling is as follows:

- Stage 1: Iterative estimation of latent variable scores. This includes the following sub-stages which are repeated until convergence is obtained:

- (1) Outer approximation of latent variable scores,
 - (2) Estimation of inner weights,
 - (3) Inner approximation of latent variable scores, and
 - (4) Estimation of outer weights.
- Stage 2: Estimation of outer weights/ loading and path coefficients.
 - Stage 3: Estimation of location parameters.

5.6 Data analysis using PLS

The first step is to develop a conceptual model for the study. As discussed in the previous chapters, a theoretically-based conceptual model was based on the literature review and interviews (Figure 4.1). However, care was taken over the number of variables to be included for PLS and the benefits achieved from having parsimonious and concise theoretical models were also kept in mind. After a theoretically-based model was developed, it then required specification of the model in more formal terms, that is, by specifying the structural and measurement models. In this context, it is important to note that the measurement model needs to be defined first. This is because, since the focus of PLS is not on individual observations, as in other multivariate techniques, but on the pattern of relationships across respondents, the input of the programme is a correlation or variance-covariance matrix of all indicators. Therefore, first the measurement model needed to be defined to specify which variables or indicators correspond to each construct, so that these latent construct scores could then be employed in the structural model.

To test the research model and hypotheses, Partial Least Square (PLS) analysis was used. PLS is a regression-based technique, with roots in path analysis which can estimate and test the relationships among constructs. It produces loadings between items

and constructs and estimates standardised regression coefficients (e.g. beta coefficients) for the paths between constructs. PLS employs a component-based approach for estimation purposes (Lohmoller, 1989) and it also places minimal restrictions on the sample size (Chin et al., 2003). In PLS, the sample size should be equal to the larger of the following: (1) ten times the scale with the largest number of formative indicators, or (2) ten times the largest number of structural paths directed at a particular construct in the inner path model.

Typically, PLS is better suited for explaining complex relationships. Furthermore, PLS can accommodate the presence of moderating effects. The analysis involves two stages: (1) assessment of the measurement model, including the item reliability, convergent validity and discriminant validity, and (2) assessment of the structural model (Barclay et al., 1995). Together, the measurement and structural models form a network of constructs and measures. The item weights and loadings indicate the strength of the measures, while the estimated path coefficients indicate the strength and the sign of the theoretical relationships (Hulland, 1999; Igbaria et al., 1995; Thompson et al., 1991). Smart PLS 2.0 was used in this study; the bootstrap re-sampling method (1000 resamples) was used to determine the significance of the paths within the structural model. Bootstrapping treats the observed sample as if it represents the population and this procedure creates a large, pre-specified number of bootstrap samples (e.g. 1000). Each bootstrap sample should have the same number of cases as the original sample and it is created by randomly drawing cases with replacement from the original sample. The PLS results for all bootstrap samples provide the mean value and standard error for each path model coefficient (Henseler et al., 2008).

5.6.1 Assessment of measurement model

The first step in the PLS analysis process is the construction and analysis of the measurement model. The measurement model allows for the reliability and validity of

the indicators associated with the model constructs to be evaluated and to analyse if the concepts are measured correctly through the observed variables as follows:

- Item reliability, for purposes of the investigation, is evaluated examining the loads (λ) or simple correlations. For accepting an indicator, it has to have a same load or superior to 0.60 (Hair et al., 1992).
- Internal consistency (construct reliability) is evaluated by Cronbach's Alpha (0.7) (Fornell & Larcker, 1981).
- Convergent validity is evaluated through the average variance extracted (AVE). Its values must be greater than 0.50 which establishes that more than 50% of the construct variance is due to its indicators (Fornell & Larcker, 1981) and it can only be applied to reflective items (Chin, 1998).
- Discriminant validity is evaluated by the AVE square root, which must be more than the shared variance between the construct and other constructs in the model.

5.6.2 Assessment of structural model

The structural model evaluates the weight and the magnitude of the relationships (hypotheses) among several variables. Two basic indices are used for this evaluation: explained variance (R^2) and the standardised coefficient path (β).

- R^2 indicates the variance explained by the construct within the model. It has to be the same or more than 0.1, as small values, regardless of their significance, provide little information (Medina & Chaparro, 2008).
- β represents the coefficient path, which is identified in the PLS Graphic by the arrows which involve the constructs of the internal model. This coefficient is obtained in the traditional way (like a multiple regression). Chin (1998) proposed that to be considered significant, the standardised coefficient path should reach at least the value of 0.2 and it would be ideal if it reached over 0.3.

5.7 Data analysis for three research models using PLS

As mentioned earlier in this chapter, since there were no differences in educational level categories and to avoid complicating the model and keep the study manageable, the differences in gender and length of system use were left to further research. Therefore, the study sample was divided into three PLS models according to age which showed significant differences between its categories and the user satisfaction variable. These age groups (PLS models) were: group 1= 53 respondents, group 2= 80 and group 3= 124. In this section, the analysis of group 1 will use PLS technique in two stages:

- **Measurement model (Model 1)**

The respondents' ages in this group ranged between less than 20 up to 39. The measurement model consisted of the relationships between the observed variables (items) and the latent constructs which they measured.

- **Item reliability**

The first step when running the measurement model is to ensure that the model can be identified, which means that estimates for all model parameters can be established. Hair et al. (1998) claimed that the minimum allowable number of indicators for each latent variable is two, but three or more are better.

The 23 indicators presented acceptable values (Table 5.10); the loading factors were between 0.655 and 1.000, as recommended by Hair et al. (1992) who indicated that for accepting an indicator, it has to have a same load or superior to 0.60 (Hair et al., 1992). All the items below these loadings were dropped from the model. The initial and final numbers of items for each construct are presented in Table 5.11. Weights and loadings of items indicate the strength of the measures, while the estimated path coefficients

indicate the strength and the sign of the theoretical relationships (Hulland, 1999; Igbaria et al., 1995; Thompson et al., 1991).

Model 1 has 23 indicators which include 21 reflective indicators and two latent variables with one only item, training and individual impact on task innovation, and hence, these two variables are formative indicators. In reflective indicators, the direction of causality is from the construct to the indicators, thus observed measures are assumed to reflect variations in latent variable and, thereby, changes in the construct are expected to be manifested in changes in all indicators comprising the multi-item scale. Formative measurements are used when a construct is viewed as an exploratory combination of its indicators variables, with each variable embodying an independent dimension in its own right.

Table 5.10 Individual reliability of reflective indicator loadings (Model 1)

Construct /item	Loading
<u>System quality</u>	
SYSQUAL 2	0.767
SYSQUAL 4	0.830
SYSQUAL 5	0.884
SYSQUAL 6	0.878
SYSQUAL 7	0.655
<u>Service quality 1</u>	
SQ 2	0.741
SQ 3	0.748
SQ 4	0.862
SQ 5	0.795
<u>Training</u>	
TRAIN 3	1.000
<u>User satisfaction</u>	
USESATIS 1	0.913
USESATIS 3	0.778
USESATIS 4	0.853
<u>Task productivity</u>	
TASKPRODUCT 1	0.907
TASKPRODUCT 2	0.826
TASKPRODUCT 3	0.777
<u>Task innovation</u>	
TASKINNOV 4	1.000
<u>Customer satisfaction</u>	
CUSTOMER 5	0.872
CUSTOMER 6	0.828
CUSTOMER 7	0.675
<u>Management control</u>	
MANCONTROL 8	0.844
MANCONTROL 9	0.936

<table border="1"> <tr> <td>MANCONTROL 10</td> <td>0.876</td> </tr> </table>		MANCONTROL 10	0.876
MANCONTROL 10	0.876		
SYSQUAL= system quality	SQ=service quality		
TRAIN=training	USESATIS=user satisfaction		
TASKPRODUCT=task productivity	TASKINNOV=task innovation		
CUSTOMER=customer satisfaction	MANCONTROL=management control		

Table 5.11 Initial & final number of items (Model 1)

Construct	Initial number of items	Final number of items
System quality	7	5
Service quality1	5	4
Training	3	1
User satisfaction	4	3
Task productivity	3	3
Task innovation	1	1
Customer satisfaction	3	3
Management control	3	3
Total	29	23

- **Internal consistency (construct reliability)**

Construct reliability measures the internal consistency of the indicators associated with a latent variable, which means the degree to which the indicators are measuring the same concept. The constructs which met the minimum requirements were kept in the model; however, constructs not meeting them were dropped. Reliability was assessed using internal consistency scores calculated by the composite reliability scores. Table 5.12 shows that internal consistency of all variables kept in the model is acceptable because all exceed the minimum requirement of 0.7 (Fornell & Larcker, 1981; Hair et al., 1998).

- **Convergent validity**

Average variance extracted (AVE) measures the overall amount of variance in the indicators accounted for by the latent variable. Hair et al. (1998) stated that “*Higher variances occur when the indicators are truly representative of the latent construct*” (p.612). AVE is generally accepted at 0.50. AVE exceeds the 0.50 (values from 0.621 to

1.000) and the reliability of the items (load factor) is above the recommendations (Table 5.12). Re-sampling (bootstrapping, 1000) was used to obtain the T-statistic values and the results show that all were significant (Table 5.14).

Table 5.12 Composite reliability & coefficient convergent validity (Model 1)

Construct	Composite reliability	AVE
System quality	0.902	0.652
Service quality 1	0.867	0.621
Training	1.000	1
User satisfaction	0.886	0.722
Task productivity	0.876	0.703
Task innovation	1.000	1
Customer satisfaction	0.837	0.634
Management control	0.916	0.785

- **Discriminant validity**

To measure the discriminant validity, the AVE square root was used. If the AVE for a given latent variable exceeds the squared correlation with the other latent variables, then the variable can be said to display discriminant validity. Therefore the validity shown in diagonal in Table 5.13 was examined and the variables satisfied the necessary conditions.

Table 5.13 Correlation of variables (discriminant validity) (Model 1)

	CUST.	MANCON.	SQ1	SYSQ.	TASKIN.	TASKPR.	TRAIN	USESATIS
CUST.	0.79624117							
MANCON.	0.697	0.886002257						
SQ1	0.426	0.555	0.788035532					
SYSQ.	0.584	0.538	0.72	0.80746517				
TASKIN.	0.356	0.614	0.584	0.412	1			
TASKPR.	0.581	0.482	0.581	0.699	0.655	0.838450953		
TRAIN	0.623	0.438	0.186	0.533	0.209	0.424	1	
USESATIS	0.782	0.592	0.432	0.72	0.11	0.462	0.64	0.849706

Note: Diagonal elements result of square root of AVE. For discriminant validity, values should exceed inter-construct correlations.

As presented in Table 5.13, the convergent and discriminant validity are adequate when the PLS indicators load much higher on their hypothesised factor than on other factors (own loadings higher than cross-loadings) and when the square root of each factor's average variance extracted (AVE) is larger than its correlations with other factors (Chin, 1998). In all cases, the AVE exceeded the squared correlation value which means that model 1 possesses very good discriminant validity.

- **Structural model (Model 1)**

The second step in the SEM analysis is to assess the structural model. The structural model is used to test the hypothesised relationships between the hypothesised latent variables in the research model. The research model is composed of exogenous (independent) and endogenous (dependent) variables. These latent variables are connected by straight lines representing the hypothesised relationships. The structural model is based on a set of assumptions of causal relationships. That means that a change in an exogenous variable changes in one or more endogenous variables. The direction of these causal relationships is based, with two exceptions, on the findings of well established studies in the field of IS (as discussed in Chapter 3).

The structural model does propose two novel relationships, that between level of training and both system quality and service quality. The causal directions of some of these relationships were based on commonsense real world observations and/or some informal interviews with bank managers, employees and IS professionals and were confirmed during the analysis of the main survey. For example, the proposed relationship between training and system quality is that the level of received training influences (positively) user's perception of the technical quality of IS in order to be able to judge the system properly. This is a proposition based on common sense. Table 5.14 shows the tested hypothesis, except for two relationships, detailed in graphic form in

Figure 5.2 which shows the research model evaluated empirically and the relationships among dependent and independent variables.

Table 5.14 Summary of PLS graph results (Model 1)

Hypotheses	Coefficient path	Standard error*	T-statistic	Remarks
Service quality1 → management control	0.3683	0.1215	3.0794	Supported
Service quality1 → task innovation	0.5838	0.1019	5.7646	Supported
System quality → task productivity	0.6994	0.0953	7.5838	Supported
System quality → user satisfaction	0.5287	0.1092	5.7205	Supported
Training → service quality	0.1864	0.2292	0.8306	Supported
Training → system quality	0.5327	0.1287	4.4137	Supported
Training → user satisfaction	0.3583	0.0929	4.3642	Supported
User satisfaction → customer satisfaction	0.7824	0.0916	8.4877	Supported
User satisfaction → management control	0.4331	0.1425	3.1387	Supported

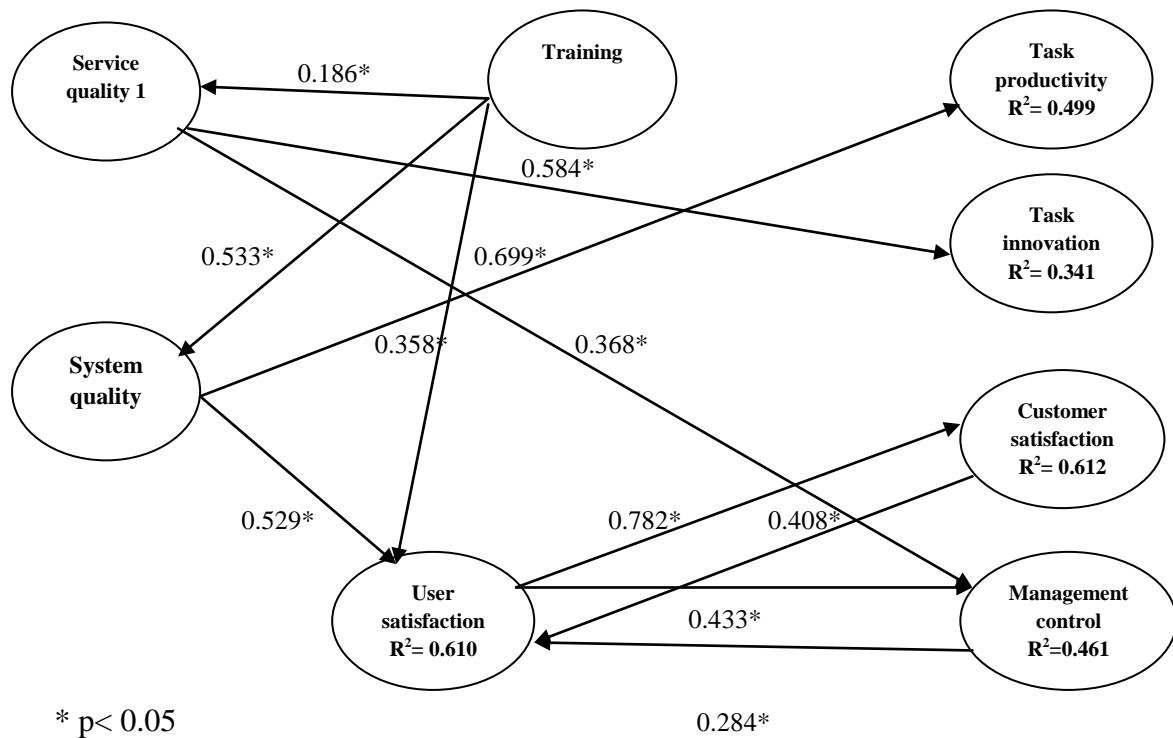
*In PLS, standard errors estimated through jack-knife procedure

However, there are two additional novel relationships not in the proposed model: between training and service quality and training and system quality. These two relationships were added after the interviews and data collection and were tested during the analysis of the main survey.

PLS uses an expanded form of path analysis. The path coefficients indicate the strength of the relationships between the variables in the model. In evaluating the structural model, it was important to determine the criteria by which hypothesised relationships will be retained or rejected from the model. Henseler et al. (2008) indicated that only relationships with T-statistic value of 1.64 or more should be retained in a model, as any path coefficients smaller than this are not practically meaningful. In this study, path coefficients were used as the first criterion to include or exclude relationships from the final PLS model and only those relationships with T-statistic value coefficients 1.64 or more were retained in the model. The second criterion was the statistical significance

(p), as only relationships that were significant at $p < .05$ were retained. Figure 5.2 shows the relationships among dependent and independent variables.

Figure 5.2 Structural model (Model 1) evaluated with PLS Graph



The essential criterion of this assessment is the coefficient of determination (R^2) of the endogenous latent variables. Chin (1998) describes R^2 values of 0.67, 0.33 and 0.19 in PLS path models as strong, moderate and weak, respectively. On the other hand, the estimation of path coefficient values of 0.02, 0.15 and 0.35 can be viewed for whether a predictor latent variable has a weak, medium or large effect at the structural level (Henseler et al., 2008).

The PLS analysis reveals a strong positive relationship between system quality and both user satisfaction and individual impact on task productivity (path coefficients 0.529 and 0.699, and significance level, $p < 0.05$). Perceived service quality had a strong relationship with individual impact on task innovation (path 0.584) and a substantial

relationship with individual impacts on management control (path 0.368). The training level appears to have a moderate relationship with service quality (path 0.185) and strong influence on system quality (path 0.533) and on user satisfaction (path 0.358).

Finally, the strongest relationships in model 1 involved user satisfaction as independent variable with individual impact on customer satisfaction (path 0.782). This research offers some strong evidence to support the notion that user satisfaction is an antecedent of job individual impacts ($R^2 = 0.61$). Substantial relationship between user satisfaction with individual impacts on management control was also revealed (path 0.433). As for feedback associations, individual impacts on customer satisfaction had a strong relationship with user satisfaction (path 0.408) and individual impacts on management control had a moderate influence on user satisfaction with IS (path 0.284).

The R^2 indicated that Training, System quality, individual impact on Customer satisfaction and individual impact on Management control explained 0.61% of the variability in User satisfaction. This means that high levels of users' satisfaction are related to high levels of IS training received and high system quality. In addition, better job impacts in terms of satisfying the customers and controlling the management would lead to higher levels in users' satisfaction with the IS. System quality was found to explain 0.49% of the variability in individual impacts on Task productivity, which means that satisfying technical needs (system quality) for IS users may result in higher or better impacts on Task productivity. Service quality was found to explain 0.34% of the variability in individual impacts on Task innovation. On the other hand, User satisfaction explained 0.61% and 0.46% of the variability in individual impacts on Customer satisfaction and Management control, respectively, which means that User satisfaction is a very good predictor of job individual impacts.

Regarding the hypothesis testing and based on the previous analysis, hypotheses H1a and H7 were supported in the research model (Model 1). H1b, H3b and H10 were partially supported. H3a was rejected. H2a, H2b, H8 and H9 were not applicable because those constructs were dropped from the research model before testing the measurement model. H4, H5 and H6 (age, educational level and length of system use) will be tested in section 6.13 as they require a different statistical technique.

- **Measurement model (Model 2)**

The respondents' age in this group ranged between 40 to 49 and the number of subjects was 80. The measurement model involved the relationships between the observed variables (items) and the latent constructs which they measure.

- **Item reliability**

The 29 indicators reflected acceptable values (Table 5.15); the loading factors were between 0.646 and 1.000, which means that they are above the minimum load of 0.60 (Hair et al., 1992). The items which were below these loadings were not included in the PLS model. Model 2 has 29 indicators which included 27 reflective indicators and two latent variables with one item- training and individual impact on task innovation, and these two variables were formative indicators. The initial and final numbers of items for each construct are presented in Table 5.16.

Table 5.15 Individual reliability of reflective indicator loadings (Model 2)

Construct /item	Loading
<u>System quality</u>	
SYSQUAL 2	0.755
SYSQUAL 6	0.740
SYSQUAL 7	0.886
<u>Information quality</u>	
INFOQUAL 2	0.688
INFOQUAL 5	0.786
INFOQUAL 6	0.754
INFOQUAL 7	0.709
INFOQUAL 8	0.763
<u>Service quality 1</u>	
SQ 2	0.748
SQ 4	0.846
SQ 5	0.872
<u>Service quality 4</u>	
SQ 15	0.802
SQ16	0.838
SQ17	0.807
SQ18	0.687
<u>Training</u>	
TRAIN 3	1.000
<u>User satisfaction</u>	
USESATIS 1	0.696
USESATIS 3	0.907
USESATIS 4	0.910
<u>Task productivity</u>	
TASKPRODUCT 1	0.937
TASKPRODUCT 2	0.968
TASKPRODUCT 3	0.873
<u>Task innovation</u>	
TASKINNOV 4	1.000
<u>Customer satisfaction</u>	
CUSTOMER 5	0.796
CUSTOMER 6	0.804
CUSTOMER 7	0.831
<u>Management control</u>	
MANCONTROL 8	0.971
MANCONTROL 9	0.966
MANCONTROL 10	0.646

INFOQUAL= information quality

Table 5.16 Initial & final number of items (Model 2)

Construct	Initial number of items	Final number of items
System quality	7	3
Information quality	9	5
Service quality1	5	3
Service quality 4	4	4
Training	3	1
User satisfaction	4	3
Task productivity	3	3
Task innovation	1	1
Customer satisfaction	3	3
Management control	3	3
Total	42	29

- **Internal consistency (construct reliability)**

Reliability was assessed using internal consistency scores, calculated by the composite reliability scores. The constructs which met the minimum requirements were retained in the model; however, constructs not meeting them were excluded. Table 5.17 shows internal consistency of the variables retained in the model was acceptable because it exceeded the minimum requirement of 0.7 (Fornell & Larcker, 1981; Hair et al., 1998).

Table 5.17 Composite reliability & coefficient convergent validity (Model 2)

Construct	Composite reliability	AVE
System quality	0.838	0.635
Information quality	0.859	0.549
Service quality 1	0.863	0.678
Service quality 4	0.865	0.617
Training	1.000	1
User satisfaction	0.880	0.712
Task productivity	0.946	0.853
Task innovation	1.000	1
Customer satisfaction	0.852	0.657
Management control	0.904	0.764

- **Convergent validity**

Table 5.17 showed that AVE exceeded the 0.50 (values from 0.549 to 1.000) and the reliability of the items (load factor) was over the recommendations. Re-sampling (bootstrapping, 1000) was used to obtain the T-statistic values and the results showed that all were significant (Table 5.19).

- **Discriminant validity**

The AVE square root was used to measure the discriminant validity. Therefore the validity shown in diagonal in Table 5.18 was examined and the variables satisfied the necessary conditions.

Table 5.18 Correlation of variables (discriminant validity) (Model 2)

	CUST.	INFOQ	MANCON.	SQ1	SQ4	SYSQ.	TASKIN.	TASKPR.	TRAIN	USESATIS
CUST.	0.810370286									
INFOQ	0.5936	0.741080293								
MANCON.	0.7058	0.609	0.8740709							
SQ1	0.4534	0.4804	0.403	0.823650411						
SQ4	0.3094	0.5383	0.5892	0.3121	0.785429819					
SYSQ.	0.4479	0.5477	0.3335	0.4502	0.264	0.796618				
TASKIN.	0.6426	0.67	0.5966	0.3752	0.3208	0.5136	1			
TASKPR.	0.4163	0.575	0.1933	0.3447	0.1692	0.4473	0.5366	0.923418		
TRAIN	0.3605	0.331	0.2265	0.3101	0.0317	0.3046	0.3693	0.2459	1	
USESATIS	0.5314	0.5652	0.6177	0.5129	0.5648	0.2927	0.416	0.426	0.1079	0.843682

Note: Diagonal elements result of square root of AVE. For discriminant validity, these values should exceed inter-construct correlations.

- **Structural model (Model 2)**

Table 5.19 shows every hypothesis, except for three relationships not originally hypothesised, detailed in graphic form in Figure 5.3 which shows the research model evaluated empirically and the relationships among dependent and independent variables.

Table 5.19 Summary of PLS graph results (Model 2)

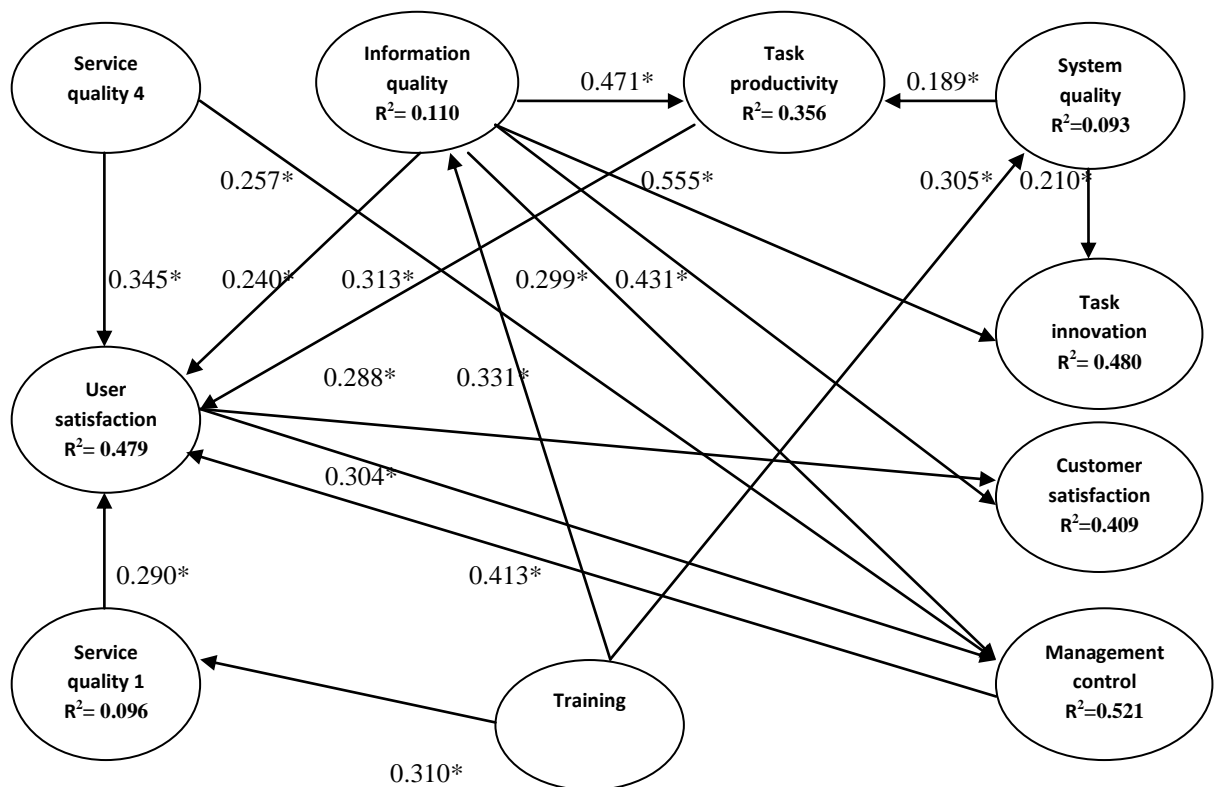
Hypotheses	Coefficient path	Standard error*	T-statistic	Remarks
Information quality → customer satisfaction	0.4309	0.1768	2.3011	Supported
Information quality → management control	0.2992	0.1364	2.0625	Supported
Information quality → task innovation	0.5553	0.1079	4.9419	Supported
Information quality → task productivity	0.4714	0.0874	5.1856	Supported
Information quality → user satisfaction	0.2403	0.1097	2.1977	Supported
Service quality 1 → user satisfaction	0.2898	0.1192	2.4828	Supported
Service quality 4 → management control	0.2567	0.1407	1.8503	Supported
Service quality 4 → user satisfaction	0.3450	0.1278	2.6610	Supported
System quality → task innovation	0.2095	0.0994	2.1336	Supported
System quality → task productivity	0.1891	0.1190	1.6738	Supported
Training → information quality	0.3310	0.1214	2.6381	Supported
Training → service quality 1	0.3101	0.1617	1.9272	Supported
Training → system quality	0.3046	0.1157	2.5377	Supported
User satisfaction → customer control	0.2879	0.1526	1.8072	Supported
User satisfaction → management control	0.3036	0.1714	1.7928	Supported

*In PLS, standard errors estimated through jack-knife procedure

The structural model proposes three novel relationships which are between level of training and information quality, system quality and service quality. The causal directions of the three relationships were based, as mentioned previously, on real world observations and/or some informal interviews with bank managers, employees and IS professionals during the data collection process and appeared to result from main survey analysis. Take for example the relationship between training and information quality.

The causal relationship is that level of training received influences (positively) a user's perception of information quality and how it should be, so as to give an appropriate feedback to IS designer and developers. This is a proposition rooted in common sense. Figure 5.3 shows the relationships among dependent and independent variables. The research model was evaluated by looking at path coefficients which indicate the strength of the relationships between the independent and dependent variables.

Figure 5.3 Structural model (Model 2) evaluated with PLS Graph



* $p < 0.05$

The analysis revealed a moderate positive relationship between Service quality 1 and User satisfaction (path 0.290) and a moderate relationship between Service quality 4 and User satisfaction (path 0.345). The analysis also provided a moderate relationship between Information quality and User satisfaction (path 0.240) and substantially strong

relationships with individual performance on the job in its impact on Task productivity, Task innovation and Customer satisfaction, with paths (0.471, 0.555, 0.431), respectively. Information quality was also found to have a moderate influence on individual impacts on Management control (path 0.299).

System quality had moderate positive relationships with individual impacts on both Task productivity (path 0.189) and on Task innovation (path 0.210). The Training level had moderate relationships with System quality, Information quality and Service quality 1 with paths (0.305, 0.331, 0.310), respectively.

On the other hand, the results indicated that User satisfaction had a moderate relationship with individual job performance in Customer satisfaction (0.288) and a moderate influence on individual impacts on Management control (0.304).

Individual impacts on Task productivity had a moderate positive relationship with User satisfaction (path 0.313) and individual impacts on Management control were found to have a strong relationship with User satisfaction (0.413).

R^2 indicated that Training explained 0.09% of the variability in System quality, 0.11 in Information quality and 0.09 in Service quality 1. Also, it was found that Service quality, Information quality, individual impact on Task productivity and individual impact on Management control explained 0.47% of the variability in User satisfaction. However, it was found that System quality and Information quality explained 0.35% in individual impacts on Task productivity and 0.48% of the variability in individual impacts on Task innovation. On the other hand, Information quality and User satisfaction explained 0.40% in individual impacts on Customer satisfaction and, finally, Information quality, Service quality and User satisfaction were found to explain 0.52% of the variability in individual impacts on Management control.

From the previous analysis, we can conclude that H2a and H2b were supported; H1b, H3a, H3b and H10 were partially supported in the research model (Model 2); H1a and H7 were rejected. H8 and H9 were not applicable because the constructs of those relationships were dropped from the research model before testing the measurement model.

- **Measurement model (Model 3)**

The respondents' ages in this group were over 49 and they numbered 124. The measurement model consisted of the relationships between the observed variables (items) and the latent constructs they measure.

- **Item reliability**

The 32 indicators reflected acceptable values (Table 5.20); the loading factors were between 0.636 and 1.000 which means that they exceeded the minimum required loading of 0.60 (Hair et al., 1992). The items which had lower loadings were excluded from the model. The 32 indicators included 25 reflective indicators and five formative indicators, three with one item- Training, User involvement and individual impact on Task innovation. It also has two latent variables with two items- User satisfaction and individual impacts on Customer satisfaction, and they are formative indicators, too. The initial and final numbers of items for each construct are presented in Table 5.21.

Table 5.20 Individual reliability of reflective indicator loadings (Model 3)

Construct /item	Loading
<u>System quality</u>	
SYSQUAL 1	0.739
SYSQUAL 2	0.741
SYSQUAL 3	0.755
SYSQUAL 4	0.862
SYSQUAL 5	0.636
SYSQUAL 7	0.755
<u>Information quality</u>	
INFOQUAL 3	0.738
INFOQUAL 5	0.733
INFOQUAL 6	0.689
INFOQUAL 8	0.831
<u>Service quality 4</u>	
SQ 15	0.771
SQ16	0.844
SQ18	0.804
<u>Training</u>	
TRAIN 3	1.000
<u>User involvement</u>	
USEINVOLV 1	1.000
<u>Top management support</u>	
TMS 1	0.755
TMS 2	0.830
TMS 3	0.953
TMS 4	0.962
TMS 5	0.928
TMS 6	0.962
<u>User satisfaction</u>	
USESATIS 2	0.993
USESATIS 3	0.992
<u>Task productivity</u>	
TASKPRODUCT 1	0.943
TASKPRODUCT 2	0.954
TASKPRODUCT 3	0.681
<u>Task innovation</u>	
TASKINNOV 4	1.000
<u>Customer satisfaction</u>	
CUSTOMER 5	0.871
CUSTOMER 6	0.922
<u>Management control</u>	
MANCONTROL 8	0.821
MANCONTROL 9	0.911
MANCONTROL 10	0.769

USEINVOLV= user involyment

TMS= top management support

Table 5.21 Initial & final number of items (Model 3)

Construct	Initial number of items	Final number of items
System quality	7	6
Information quality	9	4
Service quality 4	4	3
User involvement	1	1
Top management support	7	6
Training	3	1
User satisfaction	4	2
Task productivity	3	3
Task innovation	1	1
Customer satisfaction	3	2
Management control	3	3
Total	45	32

- **Internal consistency (construct reliability)**

Construct reliability was assessed using internal consistency scores, calculated by the composite reliability scores. Table 5.22 shows that internal consistencies of the variables which were retained were acceptable because they exceeded minimum requirements of 0.7 (Fornell & Larcker, 1981; Hair et al., 1998). The constructs which met the minimum requirements were retained in the final PLS model; however, variables not meeting them were excluded.

Table 5.22 Composite reliability & coefficient convergent validity (Model 3)

Construct	Composite reliability	AVE
System quality	0.885	0.564
Information quality	0.836	0.561
Service quality 4	0.848	0.651
Training	1.000	1.000
User involvement	1.000	1.000
Top management support	0.963	0.814
User satisfaction	0.993	0.985
Task productivity	0.901	0.755
Task innovation	1.000	1.000
Customer satisfaction	0.892	0.804
Management control	0.874	0.699

- **Convergent validity**

Table 5.22 indicated that AVE values for the constructs ranged from 0.561 to 1.000 which means they exceeded the 0.50 and the reliability of the items (load factor) was above the recommendations (Table 5.22). The re-sampling (bootstrapping, 1000) which was used to obtain the T-statistic values showed that the results were significant (Table 5.24).

- **Discriminant validity**

Discriminant and convergent validity are sufficient when the PLS indicators load much higher on their hypothesised factor than on other factors (own loading higher than cross-loadings) and when the square root of each factor's average variance extracted (AVE) is larger than its correlations with other factors (Chin, 1998). Table 6.23 shows that the discriminant validity was measured in diagonal and the variables satisfied the necessary conditions.

Table 5.23 Correlation of variables (discriminant validity) (Model 3)

	CUST.	INFOQ	MANCON.	SQ4	SYSQ.	TASKIN.	TASKPR.	TMS	TRAIN	USEINVO.	USESATIS
CUST.	0.896883493										
INFOQ	0.1988	0.749266308									
MANCON.	0.4992	0.3122	0.8360622								
SQ4	0.1788	0.598	0.5102	0.806907677							
SYSQ.	0.3736	0.7082	0.6205	0.6563	0.750799574						
TASKIN.	0.0721	0.206	0.1749	0.3317	0.3783	1					
TASKPR.	0.4634	0.5004	0.2146	0.2594	0.5372	0.5551	0.868965				
TMS	-0.0951	0.3138	0.1463	0.0894	0.2137	0.0409	0.1301	0.901998			
TRAIN	0.0051	0.4319	0.0441	0.2178	0.4282	0.328	0.5166	0.3325	1		
USEINVO.	0.1023	0.022	0.2467	0.2825	0.2109	0.3467	0.2034	-0.0715	0.0121	1	
USESATIS	0.0721	0.6569	0.3707	0.6274	0.5914	0.4639	0.5153	0.3577	0.4442	0.2568	0.992572

Note: Diagonal elements result of square root of AVE. For discriminant validity, these values should exceed inter-construct correlations.

- **Structural model (Model 3)**

Table 5.24 shows the hypothesis, except for five relationships which appeared to result from data analysis, detailed in a graphic form in Figure 5.4 which shows the research model evaluated empirically and the relationships among dependent and independent variables. However, structural model 3 proposes five novel relationships not originally hypothesised and these were between level of training and information quality, system quality, service quality, top management support and individual impact on task innovation. These five relationships were tested during the main survey data analysis and the causal directions of the relationships were based on commonsense real world observations and/or some informal interviews with bank managers, employees and IS professionals. For example, the relationship between level of training received and individual impact on task innovation. The causal relationship is that IS training influences (positively) a user's ability to use the IS to make a positive impact on his/her job in terms of task innovation. This is a proposition rooted in informal interviews with bank managers and employees during data collection.

Table 5.24 Summary of PLS graph results (Model 3)

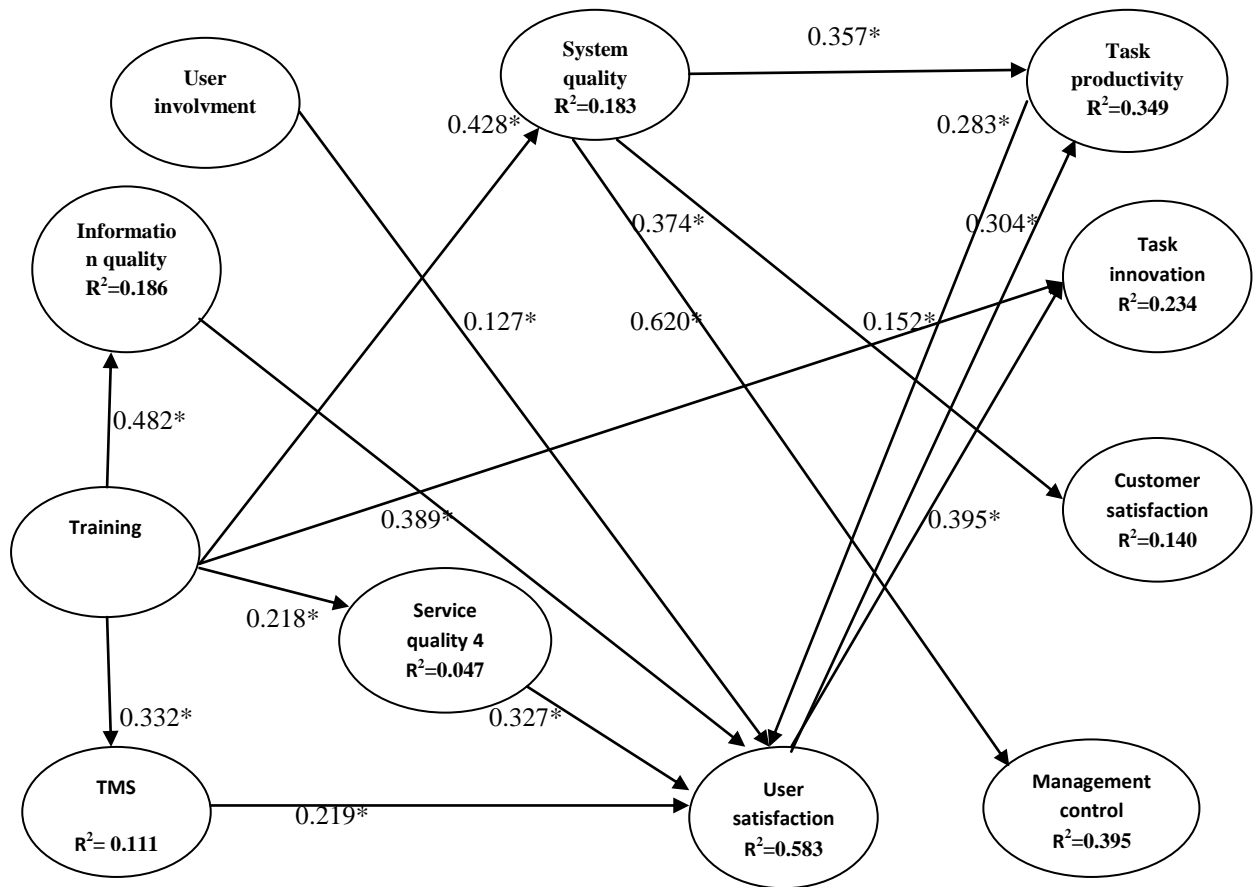
Hypotheses	Coefficient path	Standard error*	T-statistic	Remarks
Information quality → user satisfaction	0.3892	0.0981	3.8235	Supported
Service quality 4 → user satisfaction	0.3266	0.1119	2.9698	Supported
System quality → customer satisfaction	0.3736	0.0517	7.1190	Supported
System quality → management control	0.6205	0.0923	6.6098	Supported
System quality → task production	0.3575	0.1065	3.4598	Supported
Top management support → user satisfaction	0.2187	0.0755	2.9056	Supported
Training → information quality	0.4319	0.1094	4.0058	Supported
Training → service quality 4	0.2178	0.1117	1.9507	Supported
Training → system quality	0.4282	0.0913	4.8849	Supported
Training → task innovation	0.1519	0.0640	2.3692	Supported

Training → top management support	0.3325	0.0673	5.2409	Supported
User involvement → user satisfaction	0.1716	0.0469	3.7469	Supported
User satisfaction → task innovation	0.3964	0.0829	5.1353	Supported
User satisfaction → task productivity	0.3039	0.1270	2.4204	Supported

* In PLS, standard errors estimated through jack-knife procedure

Figure 5.4 shows relationships among dependent and independent variables. The research model was evaluated by looking at path coefficients which indicate the strength of the relationships between the independent and dependent variables. The R^2 statistic indicated that the model as fitted explained this percentage of variability in each construct.

Figure 5.4 Structural model (Model 3) evaluated with PLS Graph



* $p < 0.05$

The PLS model 3 results indicated that System quality had high relationships with both individual performance on Task productivity and on Customer satisfaction with paths (path 0.357, 0.374), respectively, and a substantial strong relationship with individual impacts on Management control (path 0.520). Information quality was found to have a large influence on User satisfaction (0.389). Service quality had a moderate relationship with User satisfaction (path 0.327).

The findings also revealed the appearance of two new variables which did not exist in the previous two models. These two variables were User involvement and Top management support. The results showed that they had moderate relationships with User satisfaction with paths (path 0.172, 0.219), respectively.

The Level of training was found to have a positive relationship with more than one variable in the model. It was found that it had strong influence on System quality and Information quality with paths (path 0.428, 0.432), respectively. It also had a moderate relationship with Top management support (0.332) and a weak relationship with Service quality and individual impact on Task innovation (0.218, 0.152).

User satisfaction was found to have moderate relationships with individual performance on Task productivity and Task innovation with paths (path 0.304, 0.395), respectively. Individual impact on Task productivity had also a moderate relationship with User satisfaction (path 0.283).

R^2 indicated that training explained 18.3% of the variability in System quality, 18.6% of Information quality, 0.11% of Top management support and 0.04% of the variability in Service quality. The R^2 also indicated that User involvement, Information quality, Top management support, Service quality and individual impact on Task productivity explained 0.58% of the variability in User satisfaction. In addition, the R^2 showed that

System quality and User satisfaction explained 0.34% of the variability in individual impacts on Task productivity. Training and User satisfaction were found to explain 0.23% of the variability in individual impacts on Task innovation; however, it was found that System quality explained 0.14% of the variability in individual impacts on Customer satisfaction and 0.39% of the variability in individual impacts on Management control.

From the previous analysis, we can conclude that hypotheses H2a, H8, H9 were supported, H1b, H3a, H10 were partially supported in the research model (Model 3) and H1a, H2b, H3b and H7 were rejected.

5.8 Data analysis for research model using correlation analysis

Pearson's correlation coefficients were used to check for correlation associations among the study's demographic variables and different items of user satisfaction. These demographic variables were age, educational level and length of system use which were related to research hypotheses H4, H5 and H6. These demographic variables were not included in the PLS analysis as they are nominal and continues variables.

Age was a nominal variable as it was measured by five categories from less than 20 up to 50 and over. Educational level was measured as a nominal variable by six categories from below high school to doctorate. Length of system use was a continuous variable measured by years of working with BIS. Correlation analysis was used to test the relationships between age, educational level, length of system use and user satisfaction.

5.8.1 Relationship between age and user satisfaction

The Pearson correlation coefficients in Table 5.25 indicated that there were positive relationships between age and the four items of user satisfaction. More specifically, there was a statistically positive association between age and the first item of user satisfaction which was about users' perception of meeting their information needs in

their job by the IS ($r = 0.15$), and between age and the second item, which was about users' perception of IS efficiency ($r = 0.14$). However, there was an insignificant correlation between age and the third item, which was about user's perception of IS effectiveness ($r = 0.05$); on the other hand, there was a positive significant correlation between age and the fourth item, which was about user's perception of overall IS satisfaction ($r = 0.37$).

Table 5.25 Pearson's correlation matrix of age and user satisfaction

	Age	User satisfaction1 (meeting information needs)	User satisfaction2 (perceived IS efficiency)	User satisfaction3 (perceived IS effectiveness)	User satisfaction4 (overall perceived satisfaction with IS)
Age	1.00				
User satisfaction1	0.15*	1.00			
User satisfaction2	0.14*	0.25**	1.00		
User satisfaction3	0.05	0.41**	0.59**	1.00	
User satisfaction4	0.37**	0.55**	0.11	0.29**	1.00

** $p \leq 0.01$ * $p \leq 0.05$ N = 257

The results from correlation analysis revealed that the older the bank managers, the more they perceived that BIS meet their information needs in their areas of responsibility, BISs are efficient, the more they were satisfied with BIS and vice versa. However, the relationship between older managers and their perception of BIS effectiveness was positive but not significant. In practice, these results mean that age could be a good predictor of BIS user satisfaction in the banking industry and that older bank managers tend to be more satisfied with BIS than young ones. A possible explanation for this result could be that older managers have less expectation from the BIS than young managers; therefore, they are more satisfied with BIS than younger managers. Consequently, BIS developers and designers should take young managers' expectations from BIS into their consideration when designing new IS and/or developing an existing one and try to meet the high expectations of young managers in order to gain and increase their levels of BIS satisfactions.

However, findings from the correlation analysis indicated that the relationships between age and user satisfaction items were positive, not negative as was hypothesised; Therefore, H4 was partially supported.

5.8.2 Relationship between educational level and user satisfaction

The Pearson correlation coefficients in Table 5.26 indicated that there was a statistically insignificant relationship between formal level of education and three items of user satisfaction. More specifically, there was a statistically insignificant association between education and the first item of user satisfaction, which was about user perception of meeting his/her information needs in their job by the IS ($r = 0.02$), between education and the second item which was about user's perception of IS efficiency ($r = 0.02$) and between education and third item which was about user's perception of IS effectiveness ($r = 0.08$). On the other hand, there was a positive significant correlation between education and the fourth item of user satisfaction which was about user's perception of overall IS satisfaction ($r = 0.12$).

Table 5.26 Pearson's correlation matrix of education and user satisfaction

	Education	User satisfaction1 (meeting information needs)	User satisfaction2 (perceived IS efficiency)	User satisfaction3 (perceived IS effectiveness)	User satisfaction4 (overall perceived satisfaction with IS)
Education	1.00				
User satisfaction1	0.02	1.00			
User satisfaction2	0.02	0.25**	1.00		
User satisfaction3	0.08	0.41**	0.59**	1.00	
User satisfaction4	0.12*	0.55**	0.11	0.29**	1.00

** $p \leq 0.01$ * $p \leq 0.05$ N = 257

The results showed that bank managers' formal educational level had an insignificant relationship with user satisfaction. Specifically, the formal educational levels of bank managers correlated insignificantly with managers' perception of BIS fulfilment of their information needs and of BIS efficiency and effectiveness. However, formal educational

levels of bank managers correlated significantly and positively with their overall satisfaction with BIS in general. In practice, this result means that formal educational levels of bank managers are not predictors of levels of BIS user satisfaction. A possible explanation for this result could be that formal educational courses (subjects) provided in different educational grades were not related to IS or IT subjects which means that no matter bank managers' formal educational levels, it would not affect their satisfaction with BIS in terms of its efficiency, effectiveness and meeting their information needs. However, high formal educational levels could have a small role in the overall IS satisfaction levels as they could help bank managers with the basics of IS usage.

In summary, findings from correlation analysis indicated that there was no significant relationship between educational level and user satisfaction in three items, except for the fourth item, but even this relationship was not strong enough ($r = 0.12$). Therefore, for lack of practical significance, H5 was rejected.

5.8.3 Relationship between length of system use and user satisfaction

The correlation coefficients in Table 5.27 reveal that there is an insignificant negative relationship between length of BIS use and the first item of user satisfaction ($r = -0.03$); There is an insignificant positive relationship with the fourth item of user satisfaction ($r = 0.08$). However, there was a significant positive association between length of system use and the second and the third items with coefficients $r = 0.12$, $r = 0.25$, respectively.

Table 5.27 Pearson's correlation matrix of length of system use and user satisfaction

	Duration of system use	User satisfaction1 (meeting information needs)	User satisfaction2 (perceived IS efficiency)	User satisfaction3 (perceived IS effectiveness)	User satisfaction4 (overall perceived satisfaction with IS)
Duration of system use	1.00				
User satisfaction1	- 0.03	1.00			
User satisfaction2	0.12*	0.25**	1.00		
User satisfaction3	0.25**	0.41**	0.59**	1.00	
User satisfaction4	0.08	0.55**	0.11	0.29**	1.00

**p ≤ 0.01 *p ≤ 0.05 N = 257

The results showed that the more the length of BIS use, the less bank managers perceived that BIS meets their information needs, although this relationship was not significant ($r = -0.03$). On the other hand, the more the length of BIS use, the more bank managers were overall satisfied with BIS and also it was an insignificant relationship. However, there were significant positive relationships between length of system use and managers' perception of IS efficiency and effectiveness.

In practice, these results indicated that length of BIS use is not a good predictor of user satisfaction, which means that IS designers and developers should be encouraged to design more new systems and/or develop the existing ones. Despite the fact that the length of system use may increase user's experience with the system, it may however not increase his/her satisfaction with it. On the contrary, the length of system use could decrease the bank managers' perceptions of the IS meeting his/her information needs in their job.

To conclude, from the correlation analysis results, length of system use had significant positive relationships with users' perceptions of IS efficiency and effectiveness and insignificant relationships with the other two items of user satisfaction. Therefore, and due to lack of practical significance, H6 was partially supported. Table 5.28 shows the hypothesis testing results for the three research models as follows:

Table 5.28 Summary of hypothesis testing

Hypotheses	Model 1	Model 2	Model 3
H1a	✓	✗	✗
H1b	☑	☑	☑
H2a	NA	✓	✓
H2b	NA	✓	✗
H3a	✗	☑	☑
H3b	☑	☑	✗
H4	☑	☑	☑
H5	✗	✗	✗
H6	☑	☑	☑
H7	✓	✗	✗
H8	NA	NA	✓
H9	NA	NA	✓
H10	☑	☑	☑

✓ = supported ☑ = partially supported ✗ = rejected NA = not applicable

5.9 Summary

This chapter presented the sample characteristics and the revision of the research model and hypotheses. It also showed the procedures of the hypothesis testing by using PLS technique and correlation analysis. The chapter provided the logic behind dividing the sample into three groups based on the age variable and consequently into three models, and the hypotheses were tested on the level of those three models. Additional relationships were presented in the three models as two additional relationships were tested in model 1, three in model 2 and five additional relationships in model 3. Overall, the chapter presented the findings of the analysis and the logic behind using the statistical techniques. In the next chapter, the significance of data analysis results is discussed in detail in the context of the research questions presented in Chapter 1.

Chapter 6

Findings and discussion

6.1 Introduction

Chapter 5 presented the sample characteristics and the revised research model and hypotheses. It also provided the procedures for hypothesis testing by using different statistical techniques such as PLS technique and correlation analysis. Chapter 5 showed the logic in dividing the sample into three groups and consequently into three PLS models. Chapter 6 carries forward the discussion from the previous chapter and discusses the key findings or significant relationships in the three models in relation to the research objective and related research questions and hypotheses framed for the study.

The study aimed at the following fundamental research objectives:

1. To establish the factors that lead to information system success in banking industry.
2. To investigate the different information systems models.
3. To operationalise DeLone and McLean information system model and propose suitable amendments to it.
4. To make suitable recommendations to Egyptian banking industry to benefit from the use of information systems.

The first step in the research process was to review the IS and the banking literature. Based on this revision, a conceptual IS success model was proposed which was based mainly on the adoption of the updated DeLone and McLean (2003) IS success model. However, DeLone and McLean (2003) was mainly a technical IS success model, meaning that it focused only on the technical side of the IS in determining the factors affecting IS success such as system quality, information quality and service quality.

Therefore, this study tried to add some human elements to the research model such as age, educational level and user involvement (Figure 3.5).

In order to test the practical relevance of this conceptual model, the views of IS professionals in the banking sector were sought to assess the general structure and content of the model before testing individual hypotheses through a more extensive survey. Therefore, telephone interviews were used to investigate whether statements about the variables which may affect the success of BISs as found in the literature also held in practice. Based on these interviews, two variables were dropped from the model: tenure in job and organisational level (Figure 4.1).

As presented in Chapter 4, the research methodology and the details of the questionnaire survey were presented. In Chapter 5, the statistical techniques used were presented. Descriptive statistics showed that 74.7 % of the sample used BIS more than three hours daily (out of six hours which represent the total working day in Egyptian banks) while 10.5 % used BIS between two to three hours daily. Additionally, as for the frequency of usage, 89.1 % of the sample used BIS once a day while 7 % used it few times a week. IS users were thus considered heavy users. Consequently, supported by the statistical evidence, there was not much variability between the respondents in either the actual daily BIS use or in the frequency of use. Therefore, it was decided to drop the system usage variable from the proposed research model in order to avoid further complicating the investigation and analysis of the research's model (Figure 5.1). Hence, this revised proposed model, without system usage, would be applicable only for heavy BISs' users.

Statistical analysis also showed that there were differences between males and females in relation to the overall BIS satisfaction, as females were less satisfied than males;

however, because gender was not one of the research model variables and to avoid complicating the model, testing gender differences was left to future research.

ANOVA analysis also showed that there were differences in the formal level of education between the less educated group (high school and some college) and the other educated two groups (bachelor and master degrees). However, the less educated group was only 11 subjects; it was not possible to use a separate SEM model for only eleven respondents. Therefore, this less educated group was dropped from the analysis and the second and third groups were retained and in a subsequent analysis for these two groups, the results revealed that there were no differences between them. Hence, testing the less educated user was left to future research and this revised research model would therefore be applicable to educated users.

Chapter 5 presented the logic behind choosing SEM and PLS specifically to test the research hypotheses. However, as presented in Chapter 5, the sample was divided into three smaller sub-samples according to age groups. An ANOVA analysis showed that there were differences between sample respondents in age. The sample was therefore divided into three age groups: young bank managers (less than 20 up to 39), middle age group managers (40 up to 49) and older managers (50 and over).

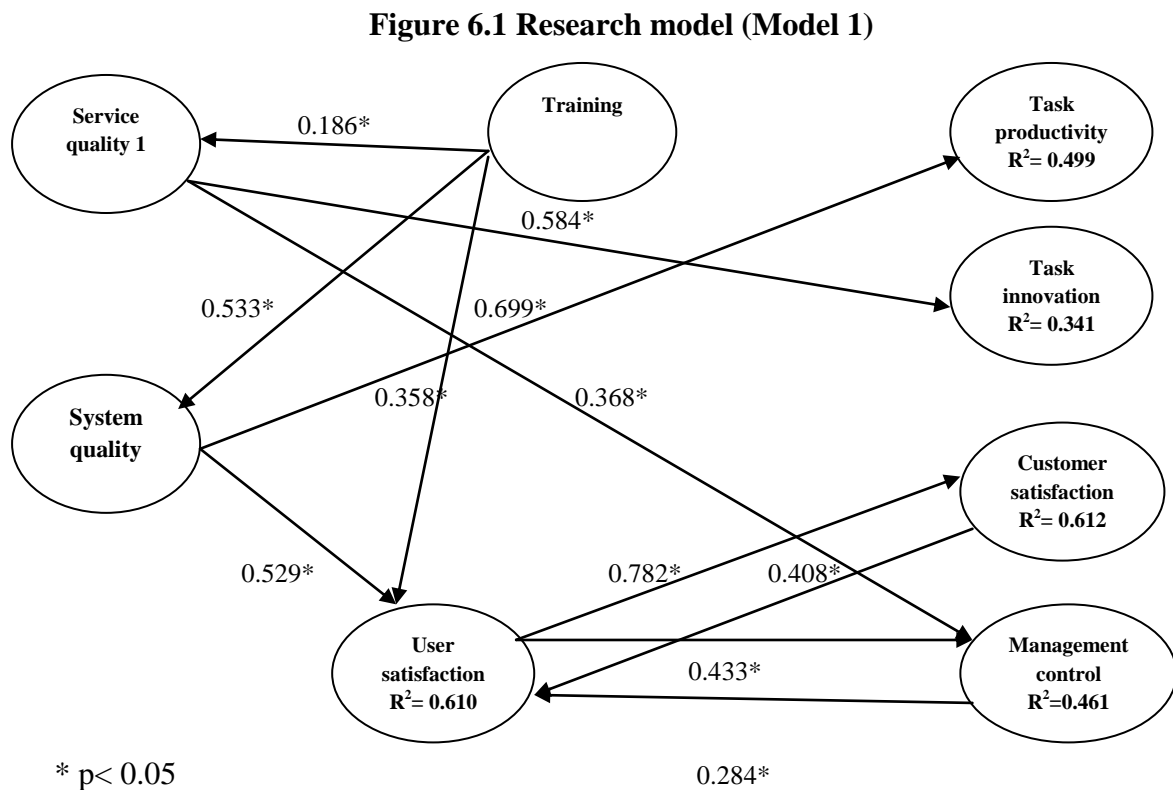
To summarise, this study proposed a conceptual BIS success model which was based on the adoption of the updated DeLone and McLean (2003) IS success model and the addition of some situational and demographic variables. The practical relevance of this proposed model was then tested by telephone interviews with BIS practitioners and a revised research model was revealed. Some statistical techniques were used on the sample which yielded the dropping of the system use variable from the research model. In the next section, the key findings from the study are presented.

6.2 Findings

This section discusses the results obtained through structural equation modelling (PLS). It also discusses the key findings from the three models and presents the proposed models for the study. The three PLS graph models (the same path diagrams discussed in Chapter 5 as Figures 5.2, 5.3 and 5.4) are introduced again here as Figures 6.1, 6.3 and 6.5 to make the discussion more reader-friendly.

6.2.1 Research model 1

Figure 6.1 shows, in the PLS graph, the factors or dimensions for evaluating IS success of young bank managers and the relationships between these dimensions.



Findings from research model 1 indicated that perceived system quality had a positive relationship with perceived user satisfaction. This finding is supported by the literature where there is strong support for the relationship between system quality and user satisfaction at the individual level (e.g. Almutairi & Subramanian, 2005; Bharati, 2002; Hsieh & Wang, 2007; Gelderman, 2002; Halawi et al. 2007; Iivari, 2005; McGill et al.,

2003; Rai et al., 2002; Seddon & Kiew, 1996; Seddon & Yip, 1992; Wixom & Todd, 2005; Wu & Wang, 2006).

Looking deep into the system quality variable, we could argue that system quality reflects the technical needs and conditions that should be in place for the ISs to have high quality such as convenience of access, response time and confidence in the system. Thus, satisfying the needs of the technical sub-system (IS) and social sub-systems (users or managers) may lead to higher levels of satisfaction. Another possible explanation is that the youngest managers tend to have high levels of user satisfaction in general when their IT/IS technical needs are met, as this generation generally has positive attitudes towards all aspects of IT (Simmers & Anandarajan, 2001).

Regarding the new proposed relationships which were not in the updated DeLone and McLean (2003) IS success model, perceived system quality was also found to have a direct positive relationship with individual impacts on task productivity. However, previous literature supported this result moderately. For example, in general there is a positive impact on individual performance (e.g. Bharati & Chaudhury, 2006; Hsieh & Wang, 2007; Rai et al., 2002; Seddon & Kiew, 1996; Wixom & Todd, 2005). In an e-commerce domain, Bharati and Chaudhury (2006) measured system quality by reliability, flexibility, ease of use and convenience of access. They found a significant relationship between system quality and decision-making satisfaction. On the other hand, Kositanurit et al. (2006) found a significant relationship between ease of use and performance. However, this result was not supported by some researchers (e.g. Subramanian, 1994; Wu & Wang, 2006). For example, Goodhue and Thompson (1995) found that system reliability and perceived ease of use had no impact on productivity and effectiveness. Also, McGill and Klobas (2005) found no relationship between

system quality and individual impact as measured by decision-making quality and productivity.

This result implies that satisfying young managers' needs of technical IS (system quality) could lead to better individual performance at the job level in the form of task productivity. However, the study findings suggest that high system quality may not lead to better individual impacts on task innovation, customer satisfaction and management control. System quality in this model was identified as confidence in the BIS, response/turnaround time, integration of the system, charge-back method of payment for services and language of the system.

Results also indicated that hypotheses H1a and H1b were not applicable. This means that respondents in this age group did not capture the information quality variable which means that young age managers did not consider information quality variable as a separate variable. Therefore, this variable was dropped from model 1. Perhaps this is because information quality is often considered as a key dimension of end-user satisfaction instruments (Ives et al., 1983; Baroudi & Orlikowski, 1988; Doll et al., 1994) and is often not distinguished as a unique construct but is measured as a component of user satisfaction. Therefore, capturing this variable is sometimes problematic for IS success research.

Findings indicated that hypothesis H3a was rejected, which implies that perceived service quality had no effect on perceived user satisfaction. However, this was an unexpected finding as previous literature supported the relationship between service quality and user satisfaction (Aladwani, 2002; Chiu et al., 2007; Choe, 1996; Halawi et al., 2007; Kettinger & Lee, 1994; Palmer, 2002; Shaw et al., 2002; Yoon et al., 1995). However, this finding could be explained in terms of the age group of model 1, as most young managers tend to have good knowledge of IT and computer aspects and

therefore may not depend heavily on IS department staff for help and assistance in dealing with IS. Thus, young managers' satisfaction may not be driven by IS service quality. Service quality in this age group was identified in terms of the tangibility dimension of service quality which was, in particular, the perception of having up-to-date software, having visual facilities which are visually appealing, IS employees' being well dressed and physical facilities in keeping with the service provided.

On the other hand, findings revealed that hypothesis H3b was partially accepted. This implies that perceived service quality had a positive effect on individual impacts on task innovation and management control. This proposed relationship is consistent with some previous literature. For example, Kettinger and Lee (1995) found that IS service quality helped to reach the organisational objectives. However, Igbaria et al. (1997) found mixed results, as the external computing support was perceived to be related to perceived system usefulness, but the internal computing support was not related to it and Blanton et al. (1992) found that personalised IT support is more effective than generalised. On the other hand, Yoon and Guimaraes (1995) found that the developers' skills for an expert system were not significantly related to the impact on the user's job. In the context of ERP systems, Kositanurit et al. (2006) found no relationship between documentation of ERP systems and individual perceived performance. This finding is significant as it means that service quality is an antecedent to individual impacts and by satisfying the service quality (tangibility dimension), young managers could improve their job performance in the areas of task innovation by introducing new and innovative ideas in their individual work to prove themselves and improve their career. Also, good service quality could lead young managers to better job performance at the management control level with improved management control on the work process, performance and ensuring a timely completion of tasks.

Perhaps the most significant finding is those relating to level of training as they provide a better understanding of the relationship between level of training and system quality, service quality and user satisfaction. Findings indicated that hypothesis H7 was accepted, which implies that level of training received had a positive effect on perceived user satisfaction. This means that when young managers receive adequate training on the BIS beforehand and feel completely prepared for it, then they will report high levels of user satisfaction. This result is consistent with our expectations and prior research on end user training which indicated that training promoted greater understanding and more favourable attitudes towards the system (Igbaria et al., 1995; Amoroso & Cheney, 1991; Cronan & Douglas, 1990; Sanders & Courtney, 1985; Schewe, 1976). For example, Cronan and Douglas (1990), in a study on end user training in public agencies, found that a high degree of user satisfaction with the computer technology resulted from the training. In addition, there has been some support of a direct relationship between training and technology acceptance (Amoroso & Cheney, 1991; Nelson & Cheney, 1987). A possible explanation for this result is that training reinforces confidence in young users' perceptions held prior to usage and/or changes unfavourable perceptions prior to training. Additionally, being trained on the BIS should increase control and feelings of comfort with the IS, thus satisfaction should increase.

Findings also showed that training had a positive effect on the perceived quality of both system and service. These relationships were not originally hypothesised but were based on some informal interviews with bank managers and IS practitioners during the data collection process. These two additional relationships were tested during data analysis as their coefficients' paths could not be ignored, as the path coefficients with system quality and service quality were 0.5327 and 0.1864, respectively. This finding was an interesting and unexpected relationship as it means that training affects the way the young bank managers perceive or capture dimensions of service quality provided by the

IS department staff. Training, as mentioned earlier, should be planned and implemented so that the positive attributes of self-training (e.g. flexibility, freedom and the ability to judge) can be obtained. Consequently, high levels of training are expected to allow young bank managers to increase their perception of service quality received from the IS department staff. In addition, training affected the way young managers perceive system quality, which means that higher levels of training would enable bank managers to increase their perception of the technical attributes of the BIS and indicate the extent to which the BIS beforehand obtained these attributes.

The study partially accepted H10 which hypothesised that there was a relationship between user satisfaction and individual impacts. The findings implied that perceived user satisfaction with BIS had a positive effect only on individual impacts on customer satisfaction and management control. This finding is consistent with some prior research that indicated strong support for the relationship between user satisfaction and net benefits at the individual level (Ang & Soh, 1997; Halawi et al., 2007; Igbaria & Tan, 1997; Iivari, 2005; McGill & Klobas, 2005; McGill et al., 2003; Rai et al., 2002; Torkzadeh & Doll, 1999; Yoon & Guimaraes, 1995). This means that young bank managers with high levels of user satisfaction with BIS would have high impacts on individual job performance. These impacts would be reflected in satisfying their customers' needs, improving customer services and improving management control on the work process, performance and ensuring timely completion of tasks.

Seddon and Shang (2002) stated the concept of cycles of system improvement, which means that firms implement IS, use IS, evaluate the benefits of its use and adjust the systems and/or process to improve their performance for the next cycle of IS use. Therefore, regarding the feedback loops, there were positive significant relationships between individual impacts on customer satisfaction and management control with user

satisfaction with IS (path 0.408, 0.284). Prior research (Hsieh & Wang, 2007; Bharati & Chaudhury, 2006; Abdul-Gader, 1997) has supported this finding, which means that the more positive the effects of BIS on young managers' individual job performance in terms of customer satisfaction and management control, the more the managers would be satisfied with the BIS and vice versa.

Age: This research also hypothesised that age had a negative relationship with user satisfaction. This hypothesised relationship was partially accepted in this study, indicating that age had a positive relationship with perceived user satisfaction. Age is an important demographic factor in examining IS (Harrison & Rainer, 1992; Zmud, 1979), although there is some support for older employees reporting more favourable beliefs and outcomes in system usage (Ang & Soh, 1997). Prior research strongly supported older employees as having less favourable beliefs and outcomes than younger employees (e.g. Harrison & Rainer, 1992; Nickell & Pinto, 1986).

Age influence has been also shown to exist in technology adoption contexts. Age was repeatedly found to have a moderating effect on performance expectancy (usefulness), effort expectancy (ease of use), social influence, and facilitating conditions in many TAM-related studies. Morris and Venkatesh's study (2000) found a direct effect of age on usefulness perceptions for both short-term and long-term usage. Later, Venkatesh et al. (2003) found age effect greater for older workers in terms of weaker willingness to adopt new IT products. Morris et al. (2005) used Theory of Planned Behaviour to examine age as a moderator of the determinants of technology use. They found older workers influenced more by attitude toward using technology, subjective norm (social influence), and perceived behavioural control (facilitating conditions).

A number of researchers attribute the differences in information processing by people to different ages. As pioneer adopters of new IS applications are commonly believed to be young. Increased age has shown to be associated with difficulty in processing complex

stimuli and allocating attention to information. People attributed such an imbalance across age levels to the difficulty felt especially by the aged people in learning computer-based IS (CBIS). Since majority of the computer technology and application software originate from overseas in English language; most of aged people typing method is complex in Arabic language, especially for those whose education is lacking; poor health status; problems with vision, neck, hands and spinal cord and the economic constraint (Bao, 2002).

Hall and Mansfield (1975) have reported that older workers attach a great deal more importance to receiving help and assistance on the job. Welford (1980) attributed such phenomenon to age-related working memory deficits more pronounced when the information presented was new, in an unfamiliar cognitive domain, or complex. Therefore, the degree to which the new technology is perceived to be easy to use would be more important for aged people in their decision to adopt or reject that technology.

Studies regarding the effect of age seem to indicate that age variable may influence technology use in multiple ways: directly affecting technology use, indirectly influencing technology use through perceptions and moderating the relationships between perceptions and technology use (Yi et al., 2005-2006). On the other hand, aged adults are reported to be willing to use modern devices and rather interested in modern technology. Computer and the Internet are becoming a popular and efficient means to help older people in China to equip themselves with modern knowledge, get themselves adapted to the changing society (Lu et al., 2006).

In this study, age had a positive relationship with perceived user satisfaction and this finding is contradictory to some prior research (e.g. Dickson & Simmons, 1970; Nelson, 1990; O'Reilly, 1982) and is consistent with other previous research (e.g. Ang & Soh, 1997; Elnady and Elkordy, 1997; Igbaria, 1992; Jackson et al., 1997; Schewe, 1976). A possible explanation is that younger managers' expectations from BIS are much higher

than those of older managers, therefore the older the managers, the less their expectation from the BIS and, consequently, the more satisfied they would be and, vice versa, the younger the managers, the more their expectations from the BIS and thus the less satisfied they would be.

This explanation is consistent somehow with Egypt Information Technology Report (2009) which indicated that on an individual basis; only 9.3 million out of approximately 30 million of the older people in Egypt had home computer access and used it at home. One of the main reasons senior citizens report for using a computer is to look for health information. On the other hand the report showed that the younger generations are getting more and more dependent on the computers and internet/web in performing daily activities (entertainment, shopping, studying).

Hence, in 20-30 years, the Egyptian society is more likely to experience a more dramatic increase in computer usage by seniors, making the study of aging issues effecting computer usage a necessity. One way to alleviate age-related barriers in using the computers and IS is by involving seniors in the IS design process.

Education: this study hypothesised that formal level of education had a positive effect on user satisfaction. This hypothesised relationship was rejected in this study, indicating that formal level of education had an insignificant relationship with user satisfaction in terms of his/her perception of IS effectiveness, IS efficiency and of IS meeting his/her information needs. However, results showed also that there was a low to moderate relationship between educational level and the fourth item of user satisfaction which was related to the overall satisfaction with BIS ($r = 0.12$) and, consequently, for lack of practical significance, H5 was rejected. This finding means that there was no significant relationship between the formal educational level of bank managers and their perceived IS satisfaction.

This finding is consistent with some prior research; for example, Hill et al. (1998) indicated that education is an extremely important factor that motivates behaviour in organisations, particularly the acceptance in change in technology in Arab societies. Igbaria (1993) found education level to have no effect on users' attitudes towards microcomputers and Schewe (1976) found it had no correlation with attitude towards the system's impact on organisation performance and work conditions. Elnady and Elkordy (1997) found that user level of education had an insignificant relationship with overall user satisfaction and Lucas (1978) found it correlated negatively. A possible explanation for the current study finding could be that the formal educational courses (subjects) provided in different educational grades were not related to IS or IT subjects. However, regarding the relationship with the fourth item of user satisfaction related to the overall satisfaction with IS, a possible reason for this positive relationship with educational level could be due, in general, to higher educational level meaning a higher level of IT and computer command, which in turn could lead to some sort of overall satisfaction with IS.

Length of system use: this research partially accepted the hypothesised relationship that length of system use had a relationship with user satisfaction. Correlation analysis was used to test this hypothesised relationship and the Pearson correlation coefficients indicated that there was an insignificant negative relationship between length of system use and the first item of user satisfaction which was related to user's perception that IS meets their information needs, although this relationship was not significant ($r = -0.03$). There was an insignificant positive relationship with the fourth item of user satisfaction which was related to user's overall satisfaction with IS ($r = 0.08$). However, length of system use had a positive significant relationship with the second and third items of user satisfaction which were related to managers' perception of IS efficiency and effectiveness. Therefore, H6 was partially accepted. This result is somehow consistent

with some previous research; for example, Sanders and Courtney (1985) found that length of system use was associated positively with user satisfaction and Vasarhelyi (1977) found it had a relationship with system acceptance. Gatian (1994) found it had a positive influence on satisfaction with information quality. However, it had an insignificant relationship with user overall satisfaction (Elnady & Elkordy, 1997). A possible explanation for the significant positive relationship with IS satisfaction of two items of effectiveness and efficiency could be that when young managers use BIS for a long time they overcome any techno-phobia they might have as they become more comfortable in using BIS, leading to an increase in their realisation of its effectiveness and efficiency, as it would be difficult to judge BIS without spending much time using it. An additional explanation is that the longer young managers interact with the BIS, the more likely that they will have positive attitudes towards it, which in turn could lead to increasing satisfaction levels.

To conclude, this study showed system quality to be a strong force in affecting individual impacts on task productivity ($R^2 = 0.499$) and that system quality and level of training influences user satisfaction ($R^2 = 0.610$). The study also showed that user satisfaction had a strong effect on the individual impacts on customer satisfaction ($R^2 = 0.612$).

Gender: Although gender was not a variable in the proposed research model, it has been a key variable in the acceptance of technology (e.g. Gefen & Straub, 1997; Hill et al., 1998; Truman & Baroudi, 1994) as computer usage has generally been viewed as a masculine activity and previous research has been conflicting on the gender differences (Gefen & Straub, 1997; Harrison & Rainer, 1992). The issue of the gender gap in IT has caught the attention of many researchers and as a result, numerous studies have been conducted to study the extent of this gap. As early as the 1980s, studies had reported

that females exhibited more negative views and perceptions towards the use of computers than males. Studies reported in the literature over 20 years ago suggested that gender has had a mediating effect on attitudes and perceptions towards IT but it is important to note that IT was an adequate term then when computers were mostly used for mathematical and word processing tasks but today, computers are being used in various facets of life. Hence, although the literature shows that extensive research related to gender and attitudes towards IT has been carried out over the years; such findings may be irrelevant today because of the ever expanding nature of IT (Wang & Hanafi, 2007).

Therefore, in this study, the Mann-Whitney test was used to compare the means of the two gender groups in relation to the user satisfaction variable. The findings indicated that the relationship between gender and user satisfaction was not significant for the first three items of user satisfaction. This finding supports the job theory of work, which posits that gender is increasingly becoming less important as a predictor of work-related attitudes and experiences (Simmers & Anandarajan, 2001). This result is also consistent with Igbaria and Nachman (1990) who found gender and end user satisfaction were not correlated but is contrary to Gefen and Straub (1997) who found that women and men differed in their perceptions of but not use of email. However, for this study, there were differences in gender in relation to the fourth item, which was related to overall satisfaction with BIS, as women were found to be less satisfied with it than men. In this regard, we could argue that the technology literature suggests IT has been male-dominated, with a focus on technology for its own sake (Gefen & Straub, 1997; Twati, 2008). In other words, in this masculine culture, it is easier to accept, use and adopt IS. Hofstede's extensive work on cultural dimensions, for example, offered insight into how sex differences in thinking and behaviour arise, which suggests, in turn, why there might be underlying IT/IS gender differences. Through analysis of 116,000

questionnaires gathered in forty countries, Hofstede posited that cultural differences manifest themselves through four dimensions of national culture. These dimensions, measured and combined into indices, are: (1) acceptance of unequal power distance distribution (PDI), (2) uncertainty avoidance (UAI), (3) acceptance of individualism (IDV) and (4) disposition toward masculine attitudes and behaviour (MAS)

According to Hofstede's original indexes analysis, the Arab countries are above average on the masculinity dimension (Twati, 2008). On the other hand, a feminine culture attitude is people-oriented and focuses on the end-user of IS.

Some studies supported this debate, for example Houtz and Gupta (2001) found significant gender differences in the way females and males rated themselves in their ability to master technology skills. Even though both genders were positive about their technological ability, males rated themselves higher than females. In another study, Shashaani and Khalili (2001) reported that female undergraduate students had significantly lower confidence than males when it came to their ability to use computers. Females also reported feeling helpless, nervous and uncomfortable around computers. Both genders, however, viewed computers as a useful tool and equally believed that computers had positive effects on individuals and society. Tsai et al. (2001) reported similar results in their study which showed no significant gender differences in the perceived usefulness of the Internet. Consistent with earlier studies (Houtz & Gupta, 2001; Shashaani & Khalili, 2001), a recent study by Broos (2005) also found significant gender differences – favouring males in terms of attitudes toward new communications technology, the extent of computer use and self-perceived computer experience. Even when females perceived themselves as being more competent in using computers, they expressed higher computer anxiety levels compared to males. This is not surprising as Liaw's study (2002) had also indicated that males had more positive perceptions towards computers and Web technologies than females.

In addition, previous literature (e.g. Nelson, 1991) often referred to concerns about gender relations as a culture characteristic in Arab societies in terms of the sharp division of labour and segregation of the sexes as male domination has been well documented among Arabs (Hill et al., 1998).

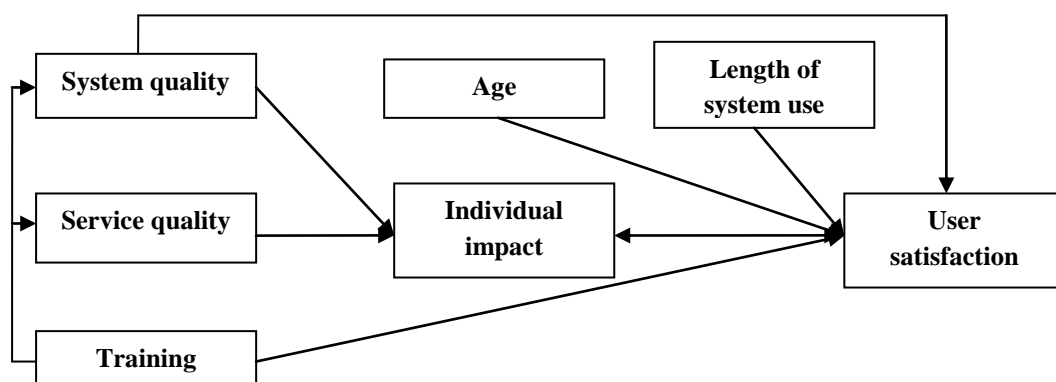
Despite Egypt is known for its less occupational segregation by gender with more women holding qualifications and having better-paid jobs, the majority of the respondents in this study were males (67.3%) and most of them occupied branch, general and department manager positions, whereas women occupied division manager positions. Therefore, women's perceptions regarding the BIS output could be different from men's, which may lead to lower levels of user satisfaction. Also, lower knowledge acquisition of the BIS by female managers could lead to a lesser degree of user satisfaction.

In addition, research on gender differences indicates that men tend to be highly task-oriented (Lu et al., 2006) and, therefore, performance expectancies, which focus on task accomplishment, are likely to be especially sapient to men. Women typically experience high levels of anxiety in using computers (Lu et al., 2006) which could lead to lower level of perceived ease of use. Men's relative tendency to feel more at ease with computers has also been demonstrated in IS literature (Gefen & Straub, 1997). Similar findings emerged in technology acceptance studies (e.g. Venkatesh & Morris, 2000; Venkatesh et al, 2003). As a predictor of intention in the short-run, men were more influenced by instrumentality, while women were more strongly influenced by social factors and environmental constraints; however, no significant gender differences in the determinants of technology use (Morris et al., 2005).

However, Morris and his colleagues notice that studies of gender differences can be misleading without reference to age (i.e., Morris and Venkatesh, 2000; Morris,

Venkatesh, and Ackerman, 2005). Examining gender and age separately may simplify the effect nature of demographic characteristics. A number of research studies found evidence supporting age moderation of gender differences. Venkatesh et al (2003) found that women born in different decades are likely to have had very different educational and occupational opportunities. As a result, the observed pattern of gender differences could be expected to differ based on age (Venkatesh et al., 2003). In sum, this line of research suggests that the definitions and consequences of being male or female at different life stages varies across generations, and thus, are open to reinterpretation and change throughout the aging process. Morris et al. (2005) recently examined the combined effect of gender and age in the context of information technology adoption. By focusing on the concurrent moderation by gender and age, they built a more comprehensive understanding of the interplay between age and gender. Additional work on gender/age and IS usage and satisfaction, looking more closely at leadership styles and other social obstacles in the examination of IS use and user satisfaction, will be left to future research. Figure 6.2 shows the BIS success variables in the young age group of bank managers and the interrelationships between these variables.

Figure 6.2 Relationship between dimensions of BIS success model for young bank managers



Firstly, it is noted that the DeLone and McLean (2003) IS success model was not supported, as it was originally updated because the information quality variable was not captured as a predicting variable for user satisfaction. Service quality did not have an influence on user satisfaction as well. However, seven novel relationships were supported in this model. Perhaps the most significant and unexpected relationships were between level of training and system and service quality, which means that within this young age group, increasing the BIS training level would positively increase users' perceptions of system and service quality in addition to their BIS level of satisfaction, which finally would increase the individual impacts.

Age should be taken into consideration as more BIS training sessions could be required for this young age group of bank managers. Also, relationship between length of system use and user satisfaction implies that certain stability in BIS usage is required to gain more user satisfaction. Secondly, system and service quality had positive direct relationships with individual impacts which implies that technical aspects of IS (e.g. confidence in system, system language) and the tangibility dimensions of service quality (e.g. up to date software, appealing IS facilities, appearance of IS employees) should be taken into consideration when designing new ISs.

In summary, this research implies that bank CIOs, IS developers and designers should keep these variables and relationships in their minds when designing new ISs or developing existing ones in order to gain users' satisfaction with ISs and finally better job performance.

6.2.2 Research model 2

This model is designed for the middle age group of bank managers between 40 and 49.

Figure 6.3 shows, in PLS graph, the factors affecting BIS success and the relationships between these factors.

Figure 6.3 Research model (Model 2)

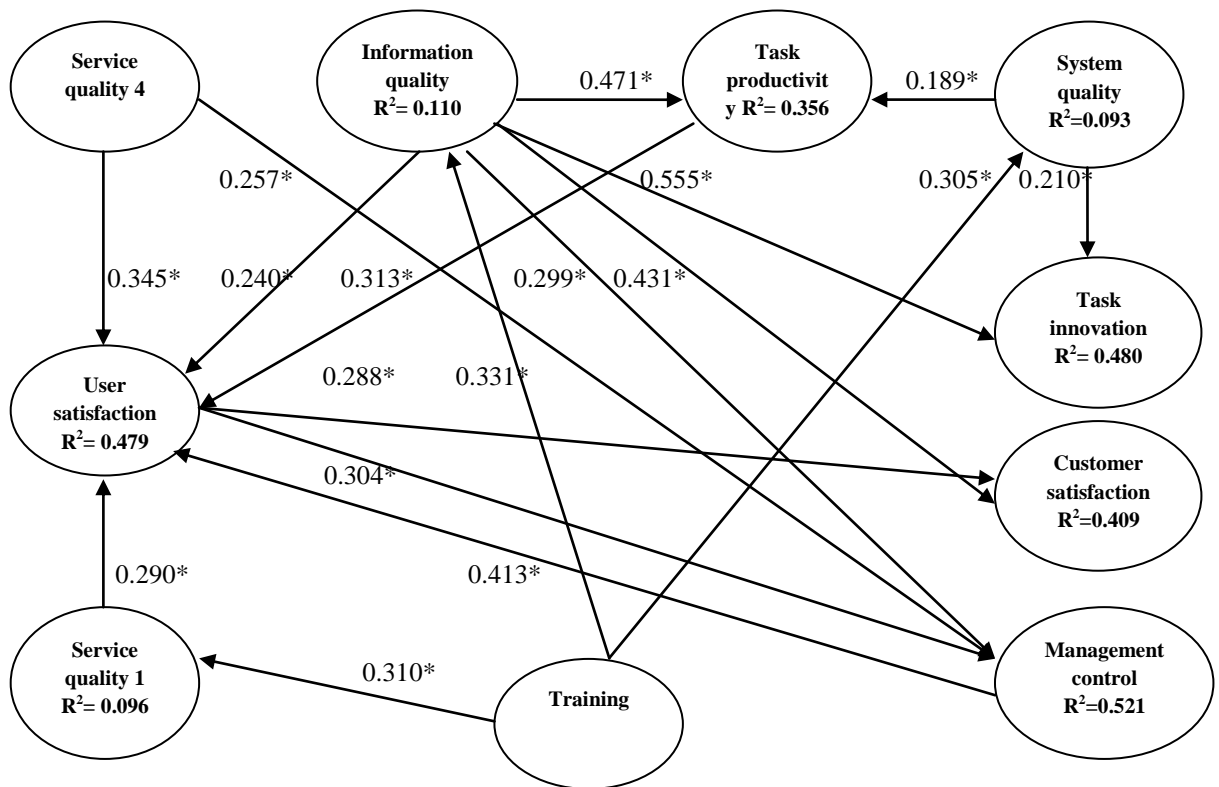


Figure 6.3 shows that there are more dimensions included in this model than in the previous model. For example, information quality and service quality 4 (assurance dimension) variables did not exist in model 1, however, they do exist in this model, which makes it more complicated.

This study proposed that system quality had a relationship with user satisfaction. However, findings from this model revealed that this hypothesised relationship was

rejected. This implies that perceived system quality had no relationship with perceived user satisfaction which was an unexpected finding, as previous research gave no indication of such a relationship being missing between the two variables. This finding is contrary to the findings of Ang and Soh (1997) who found older workers reporting higher levels of user information satisfaction. A possible reason for the finding is that this middle age group has more career and job uncertainty and they are less committed to their work roles and to the organisation than both the older and younger employees (Simmers & Anandarajan, 2001). This result could also be due to the fact that they got used to the BIS that they use heavily and the technical needs of the system (system quality) became no longer satisfying to them. However, they would need better type of information or better BIS services, not system quality, to be more satisfied.

On the other hand, findings indicated that perceived system quality had a positive relationship with individual impacts only on task productivity and task innovation. System quality was identified in this age group by confidence in the system, charge-back method of payment for services and system language.

It is noticed that the young age group of bank managers considered two additional indicators (flexibility of the system and response/turnaround time) in their capturing the system quality construct which did not exist in this middle age model. This means that bank CIOs, BIS developers and designers should consider the BIS flexibility and high response time when young age users are involved.

This hypothesised relationship was supported by some of the previous literature which tested the direct associations between system quality and individual impact and found them to be statistically significant (e.g. Amoli, 1996; DeLone & McLean, 1992; Seddon & Kiew, 1994; Wixom, 2001). System quality was measured in terms of ease-of-use, functionality, reliability, flexibility, data quality, portability and importance. Individual

impacts were measured as quality of work environment and job performance. However, other researchers did not support this result (e.g. Goodhue & Thompson, 1995; McGill & Klobas, 2005; Wu & Wang, 2006; Subramanian, 1994; Kositanurit et al., 2006). This finding implies that, in this group of middle age bank managers, satisfying their needs of system quality (confidence in the system, charge-back method of payment for services and system language) could lead to better individual job performance in the form of task productivity and task innovation. However, the study suggests that high system quality would not lead to better individual impacts on customer satisfaction and management control.

A key variable of the model proposed for this study is information quality. Findings revealed that the hypothesised relationship associated with information quality was accepted in this study (path= 0.240). This implies that perceived information quality had a positive relationship with perceived user satisfaction. This direct relationship has been explored in numerous other studies (e.g. Bharati, 2002; Chiu et al., 2007; Iivari, 2005; Palmer, 2002; Wixom & Todd, 2005; Wu & Wang, 2006). Typically, these studies have found a consistent relationship between information quality and user satisfaction at the individual unit of analysis (e.g. Almutairi & Subramanian, 2005; Halawi et al., 2007; McGill et al., 2003; Rai et al., 2002; Seddon and Kiew, 1996; Seddon and Yip, 1992). Studies especially examining the information quality aspects of websites have found significant relationships between content and layout and user satisfaction. Contrary to expectations, this relationship was not found in the previous model of the young age group as the information system variable itself was not recognised. However, as previously mentioned in section 4.8.2 in Chapter 4, the reason could be that information quality is often not distinguished as a unique construct but is measured sometimes as a component of user satisfaction (Ives et al. 1983; Baroudi & Orlikowski, 1988; Doll et

al., 1994). Information quality construct was recognised in this model as information reliability, accuracy, currency, timeliness and format of output.

As for the hypothesised relationship between information quality and individual impacts, findings showed that perceived information quality had a positive relationship with individual impacts on task productivity (path= 0.471), task innovation (0.555), customer satisfaction (0.431) and management control (0.299). These relationships were moderately supported by some previous literature (e.g. Kositanurit et al., 2006; Kraemer et al., 1993; Petter et al., 2008). For example, Gatian (1994) found that information quality was related to decision-making efficiency. Information quality was also found to be related to decision-making satisfaction (Bharati & Chaudhury, 2006) and to quality of work and time-savings (D'Ambra & Rice, 2001; Shih, 2004). Perceived information quality was also significantly related to perceived usefulness (e.g., Rai et al., 2002; Seddon & Kiew, 1996; Shih, 2004; Wu & Wang, 2006). However, Hong et al. (2001/2002) found mixed results in this relationship and Kulkarni et al. (2006) did not support the relationship between information quality and net benefits in a knowledge management context. Although information quality's influence was found to be less on individual impacts on management control, this research indicates that by satisfying the information needs (in terms of reliability, accuracy, currency, timeliness and format of output) for the middle age group of bank managers, this may lead to higher levels of user satisfaction and higher or better impacts on individual job performance (in terms of task productivity, task innovation, customer satisfaction and management control).

Regarding the hypothesised relationship between service quality and both user satisfaction and individual impacts, these two relationships were partially accepted. This finding indicates that perceived service quality had a positive effect on perceived user satisfaction. However, the reason for the partial support is that it was found that only

two dimensions of service quality were included in model 2: SQ1 (tangibility) and SQ 4 (assurance). This direct relationship has been explored and supported by previous research (Aladwani, 2002; Chiu et al., 2007; Choe, 1996; Halawi et al., 2007; Kettinger & Lee, 1994; Palmer, 2002; Shaw et al., 2002; Yoon et al., 1995). This research thus suggests that by satisfying the needs for good IS quality service, this could lead to higher levels of user satisfaction among middle age managers. A possible explanation for this result could be due to the age group in model 2 (40 to 49), as those middle age managers could not have the necessary IT knowledge that young managers have (this relationship was rejected in model 1) and therefore their need for IS department staff assistance and service would be greater than that of young managers. Therefore, the more IS service they receive, the more satisfied with BIS they will be.

This research found that perceived service quality had a positive effect on individual impact only on management control. This finding found some support from previous research (e.g. Blanton et al., 1992; Kettinger & Lee, 1995) which means that by satisfying the needs for good BIS service quality, this could lead to improving job performance of the middle age group of bank managers at the management control level, which means that their control over work process, performance and completion of tasks would be better. However, the study suggests that high service quality would not lead to better individual impacts on task productivity, task innovation and customer satisfaction.

It was expected that the older the employees, the more IS training they would need and the more satisfied they would be. However, the hypothesised relationship between level of training and user satisfaction was unexpectedly rejected in this study. On the other hand, this relationship was accepted in the previous model, indicating that the young age group of bank managers tend to be more satisfied with the BIS when they receive more BIS training.

This finding is also contradictory to prior research where the importance of user training for system success has been widely recognised (Nelson & Cheney, 1987; Igbaria et al., 1995; Yoon et al., 1995). Guimaraes et al. (2003) perceived training as providing a general background to familiarise users with the general use of computer technology, the process of system development and helping in effective use of the specific system beforehand. A possible explanation for this result could be due to an insufficient level of training received, as 65% of bank managers' opinions revealed that they received some training but inadequate to enable them to use the BIS effectively and training was given sometimes once, when the bank started to use new applications in bank branches, while 31.5% of the managers received adequate training and 3.5% did not receive any BIS training beforehand.

This research presented three novel relationships associated with level of training and perceived system quality, information quality and service quality. However, these relationships were not originally hypothesised but were tested during the main data analysis.

This study found that level of training had moderate positive relationships with perceived qualities of system (path = 0.305), information (0.331) and service (0.310). In other words, this study suggests that high levels of training would allow middle age group bank managers to judge and identify the perceived quality of IS service from the IS department staff. Also, it would allow them to identify the technical attributes of the IS and the perceived information quality as well. This finding supports the notion that level of training is a very important factor in the IS success (Nelson & Cheney, 1987; Igbaria et al., 1995; Yoon et al., 1995) and introduces the concept that level of training plays an important role in influencing system quality, information quality, service quality and in indicating the significance of training as a predictor of IS success.

The relationship between perceived user satisfaction and individual impacts was hypothesised by H10 which was partially accepted. This finding implies that perceived user satisfaction had an effect on individual impacts on customer satisfaction and management control only. This finding is consistent with prior research indicating that higher levels of user satisfaction would lead to higher impacts on individual jobs. User satisfaction has been found to have a positive impact on user's job (Yoon & Guimaraes, 1995; Guimaraes & Igbaria, 1997; Doll and Torkzadeh, 1999), to improve performance (McGill et al. 2003), to increase productivity and effectiveness (Igbaria and Tan, 1997; Rai et al., 2002; McGill & Klobas, 2005; Halawi et al., 2007) and to enhance job satisfaction (Ang & Soh, 1997). Seddon and Kiew (1994) analysed the relationship between user satisfaction and individual impact when the latter was defined as perceived usefulness and they found a correlation between them. Amoli and Farhoomand (1996) reported that six factors of end user computing satisfaction (documentation, ease of use, functionality, quality of output, support and security) explained 50% of the variance in end user performance. They also found that satisfaction with the quality of output and with the functionality of the system were the most significant predictors, whereas documentation was the least significant. Gatian (1994) investigated the relationship between user satisfaction, decision performance and user efficiency in the case of direct and indirect users of the same system. She found a close association between user satisfaction and decision performance and efficiency. Although the relationship between user satisfaction and individual impact on customer satisfaction and management control is moderate (path= 0.304, 0.288), respectively. This research suggests that the middle age group of bank managers with high levels of user satisfaction with IS would have high impacts on individual job performance. These impacts would reflect also in satisfying their customers' needs, improving customer

services and in improving management control of the work process, performance and ensuring timely completion of tasks.

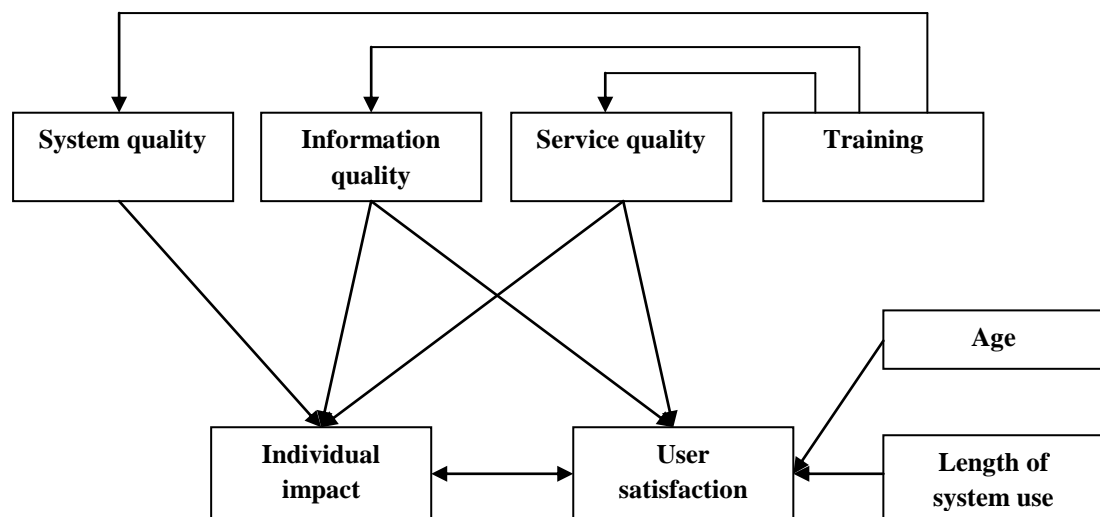
Regarding the cyclical nature of IS success, positive moderate to strong relationships were found between individual impacts on both task productivity and management control and user satisfaction (path 0.313, 0.413; $p < 0.05$). These relationships are consistent with previous studies that found a positive relationship between perceived usefulness and user satisfaction (e.g. Hsieh & Wang, 2007; Rai et al., 2002; Seddon & Kiew, 1996). Three other studies found that the impact an expert system has on a user's job directly affects user satisfaction (Yoon et al., 1995; Guimaraes et al., 1996; Wu & Wang, 2006). Abdul-Gader (1997) found a significant association between perceived productivity and user satisfaction in computer-mediated communication systems in Saudi Arabia. Bharati and Chaudhury (2006) found a relationship between decision-making satisfaction and overall user satisfaction in an e-commerce websites context. Although this current study did not reveal a direct positive relationship between user satisfaction and individual impacts on task productivity, it however highlights the fact that positive job performance at the task productivity and management control levels would lead the middle age group of bank managers to have positive levels of user satisfaction with IS.

As for the demographic variables age, educational level and length of system use, the study partially accepted H4 and H6 that a relationship exists between the two demographics, age and length of system use, and user satisfaction. The results indicate that age and length of system use play a role in positively influencing user satisfaction. This indicates that the older the managers and the longer they use the BIS, the greater the level of user satisfaction. However, H5 was rejected, indicating that formal level of education has no influence on user satisfaction as previously discussed in section 6.2.1

in this chapter. Figure 6.4 shows the IS success variables in the middle age group of bank managers and the relationships between these variables.

Figure 6.4 Relationship between dimensions of BIS success model for middle age

bank managers



To summarise the findings from this model, Figure 6.4 illustrates the key variables and the relationships between these variables associated with middle age bank managers' BIS success model. This model is more comprehensive than the previous model of young age managers as it includes five of the main DeLone and McLean (2003) IS success factors named system quality, information quality, service quality, user satisfaction and individual impacts. It is noticed that five novel relationships were supported or partially supported in this model (the influence of system quality, information quality and service quality on individual impacts, the relationship between age, length of system use and user satisfaction). This finding indicates that the direct influence of system and service quality has been demonstrated to be relatively weak in influencing individual impacts; however, information quality was found to have a strong influence on individual impacts, except for influence on individual impacts on

management control which was weak and the coefficient path = 0.299. Also, the direct relationship between age and length of system use with user satisfaction indicates that, to bank managers, user satisfaction is related to older employees and longer usage of BIS.

Three additional novel relationships, not originally hypothesised, were accepted in this model (between level of training and system quality, information quality and service quality). From the researcher's point of view, these latter relationships are a significant finding as it indicates that within this middle age group of bank managers, increasing the BIS training level would positively increase users' perceptions of system, information and service quality, which could ultimately have an influence on user satisfaction and finally on better job performance.

As mentioned earlier in this chapter, age should be taken into consideration as more BIS training sessions could be required for this middle age group of bank managers as well. Also, a certain stability in BIS usage is required to gain user satisfaction.

Information and service quality had positive direct relationships with user satisfaction, which implies that informational aspects of BIS (e.g. information reliability, accuracy, currency, timeliness and format of output) and the tangibility (e.g. up to date software, IS employees well dressed and physical facilities keeping up with the service provided) and assurance dimensions of service quality (e.g. IS employees have the knowledge to do their job well, behaviour of IS employees instils confidence in users, users feel safe in their transactions with IS employees and IS employees are consistently courteous with users) should be taken into consideration when designing new ISs.

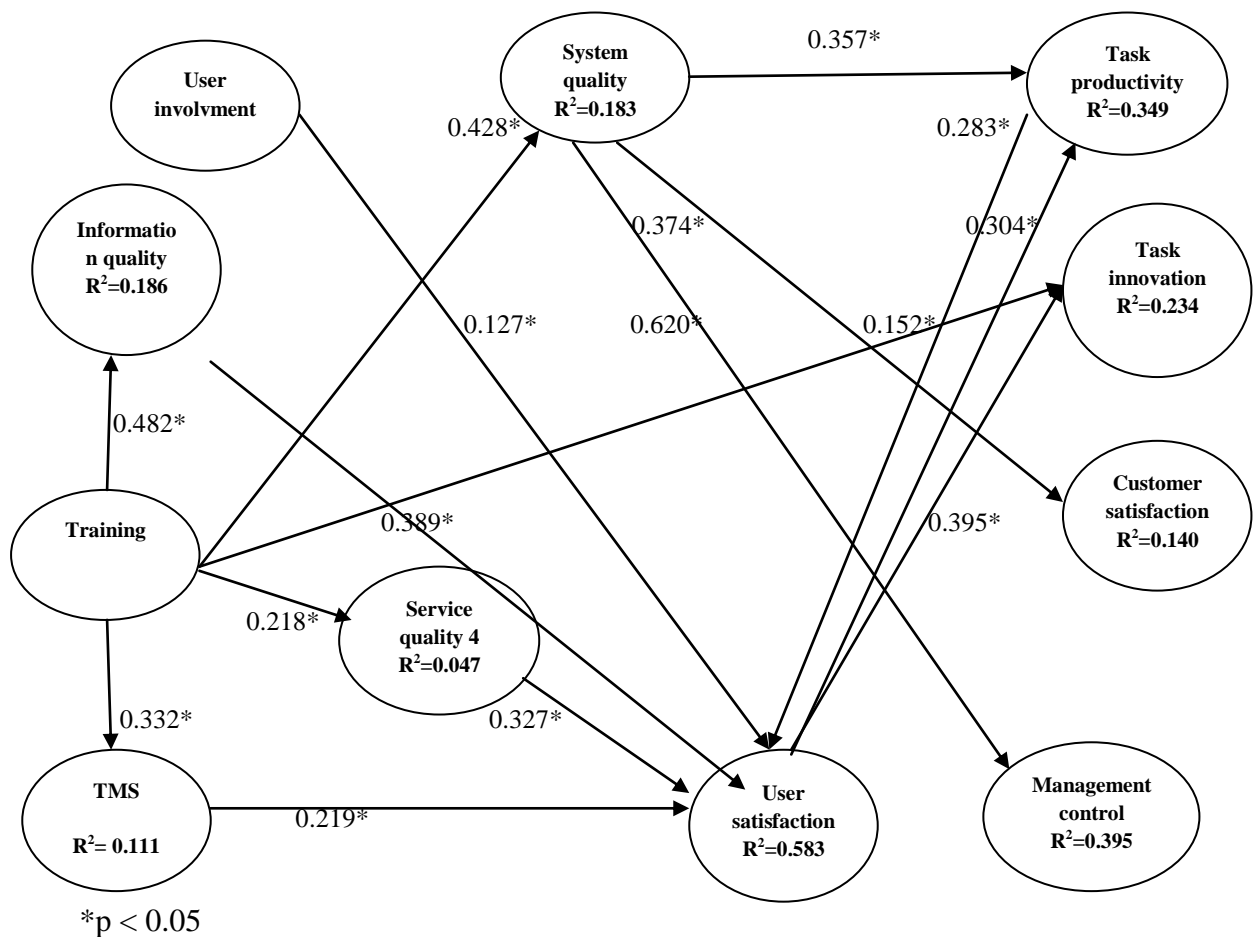
To conclude, this research implies that bank CIOs, BIS developers and designers should take these dimensions into their considerations when designing new ISs or developing

existing ones in order to gain users' satisfaction with ISs and finally better job performance.

6.2.3 Research model 3

The older age group of bank managers are the target sample for model 3 in which managers' ages were 50 and over. Figure 6.5 shows, in PLS graph, the IS success dimensions and the relationships between them.

Figure 6.5 Research model (Model 3)



This model could be described as the most extensive model of all the three. Firstly, this model included two additional variables not existing in the previous two models: user involvement and top management support. Secondly, this model included five novel

relationship not originally hypothesised, which are the relationship between training and system quality, information quality, service quality, top management support and individual impacts on task innovation.

Findings revealed that system quality has a strong influence on individual impacts on management control (path = 0.620) and moderate influence on individual impacts on task productivity and customer satisfaction with paths 0.357, 0.374, respectively. H1b was thus partially accepted. System quality was recognised in this model as convenience of access, confidence in the system, flexibility of the system, response/turnaround time, integration of the system and language of the system.

Previous studies highlighted a strong relationship between system quality and individual impacts (e.g. Amoli, 1996; Bharati & Chaudhury, 2006; Goodhue, 1995; Hong et al., 2001/2002; Kositanurit et al., 2006; Seddon & Kiew, 1994; Seddon & Kiew, 1996; Rai et al., 2002; Wixom, 2001; Wixom & Todd, 2005). This finding implies that, in this age group of older bank managers, satisfying their needs of technical IS (system quality) could lead to better individual job performance in the form of task productivity, customer satisfaction and management control.

This model strongly indicates that system quality tends to influence individual impacts on management control. This relationship could be explained by the fact that most managers in this age group are in high level administrative management positions and their role in the banks is more related to management control activities than to creating or innovating new ideas for the banks. Therefore, satisfying their technical needs (system quality) would lead to higher levels of management control.

The relationship between system quality and individual impacts on task productivity and customer satisfaction in this study could be explained in terms of the role the system quality plays in motivating use of BIS in tasks, facilitating BIS use in tasks and

in satisfying customer needs, therefore by providing the technical needs, flexibility, easy language, high data transmission and high response to information needs, the BIS users could be able to use it effectively in task productivity and customer satisfaction job aspects. However, the study suggests that high level of system quality would not lead to better individual impacts on task innovation.

This study hypothesised that information quality had a relationship with user satisfaction and this relationship in H2a was accepted. This was an expected result, as the relationship between information quality and user satisfaction was strongly supported in the literature (e.g. Almutairi & Subramanian, 2005; Bharati, 2002; Chiu et al., 2007; Palmer, 2002; Halawi et al., 2007; Iivari, 2005; McGill et al., 2003; Rai et al., 2002; Schewe, 1976; Seddon and Kiew, 1996; Seddon and Yip, 1992; Wixom & Todd, 2005; Wu & Wang, 2006). This was a substantial relationship (0.389) and implies that older bank managers considered the perceived information quality to have an effect on or to be an important predictor of their perceived user satisfaction with BIS. Information quality was identified in this model as information completeness, information relevancy, information currency and timeliness.

H3a was associated with the hypothesised relationship between service quality (assurance dimension) and user satisfaction and it was partially accepted, indicating that perceived service quality had a positive effect on perceived user satisfaction and that higher level of service quality in the assurance dimension (IS employees have the knowledge to do their job well, behaviour of IS employees instils confidence in users, users feel safe in their transactions with IS employees), would lead to higher levels of user satisfaction with BIS.

On the other hand, the novel relationship hypothesised in H3b between service quality and individual impacts was rejected. This finding is supported by some prior research

(e.g. Kositanurit et al., 2006; Yoon & Guimaraes, 1995) and suggests that higher levels of service quality may not lead to higher levels of job performance at any level. However, this finding was unexpected because this research presumed that higher level of service quality may lead to improving job performance.

One possible reason for this result is that older managers (usually with higher positions in banks), despite their BIS usage and their need for BIS service quality, do not get heavily involved with IS department staff through direct relationship, rather they contact IS staff through their employees; thus they may not consider that IS service quality, provided by IS department staff, affects their job performance.

User involvement has low relationship with user satisfaction. User involvement included one question about whether users were fully involved in the design of new IS. Consistent with expectations and prior research, user involvement was found to have an influence on user satisfaction (0,127) despite its low effect. Amoako-Gyampah and White (1993), Montazemi (1988), Noshei (1984) and Swanson (1974) found that user involvement was correlated positively with user satisfaction. User involvement is considered an important factor to ensure high quality systems as it increases system success through increasing system usage and user satisfaction with the system (Baroudi et al., 1986). Also, user involvement was reported to increase the chances of user acceptance and successful implementation because it helps tailor the system to meet users' perceptions (Franz & Robey, 1986; Watson et al., 1997). However, Schewe (1976) found no relationship between user involvement and attitude towards the system. Elnady and Elkordy (1997) found that user involvement in system development had a positive association with user overall satisfaction.

This current research result implies that the more the older bank managers get involved in the design of a new BIS, the more they perceive high levels of user satisfaction (H8

was accepted). However, a possible reason for this low relationship with user satisfaction could be due the low degree of user involvement (28.4 % of the respondents agreed on being fully involved in the design of a new BIS) which could inhibit them from being more satisfied with the BIS.

User involvement in the BIS development and implementation was found to be related with positive individual and organisational benefits (Lawrence & Law, 1993), getting reports and successful systems (Robey et al., 1989) allowing better understanding of requirements and needs (Chow & King, 2001), the users' having a positive reaction and acceptance of the system (Lawrence & Law, 1993) and thinking that the system is useful (Franz & Robey, 1986). Therefore, low levels of user involvement in the design of IS could lead to low relationship levels with user satisfaction and vice versa.

Consistent with expectations and previous research (e.g., Doll, 1985; Jarvenpaa & Ives, 1991), top management support was found to have also a moderate influence on user satisfaction (0.219). Aladwani (2002) investigated the impact of top management support on end user satisfaction and highlighted its importance for successful deployment of computing within Kuwaiti public organisations. Sabherwal et al. (2006) and Brynjolfsson (1993) also indicated that top management support for ISs is expected to directly affect IS success by increasing system use and user satisfaction with the system and the absence of that support is a critical barrier to IS use and the lack of some organisations' productivity has been attributed to it. Top management support takes many forms, such as encouragement to use the IS, providing a wider selection of user-friendly software of special use to different jobs, offering educational programmes and applying IT to support a wider variety of business tasks (Igbaria et al., 1997).

A possible reason for this finding could be that top management support in this age group (older managers) means that top management could undertake some activities

such as promoting better BIS quality and facilitating the allocation of needed resources before, during and after BIS usage, and these activities could lead to higher levels of user BIS satisfaction and finally better job performance. Therefore, H9 was accepted.

This model revealed five novel relationships between training and system quality (0.428), information quality (0.482), service quality (0.218), top management support (0.332) and individual impacts on task innovation (0.152).

The hypothesised relationship in H7 between training and user satisfaction was unexpectedly rejected in this model. It was hypothesised that the older employees would need more training to be more familiar with the BIS and that would increase the level of their satisfaction with BIS. However, this is not the case here, as older employees considered training level to have no effect on their satisfaction with BIS. A possible explanations could be that either the BIS was easy to use by older bank managers themselves without training or that older managers were not satisfied with the level of BIS training provided. Therefore, high levels of user training did not lead to higher levels of user satisfaction as was expected.

The relationship between training and system quality, information quality and service quality was discussed earlier in this chapter. However, the new moderate relationship between training and top management support implies that BIS training could affect the level of user perception of support given by the top management. As training level could clarify the importance of BIS to the employees' jobs and the organisation as a whole, this would increase the level of older managers' perception of management support for BIS by involving top management with and being interested in it, understanding its importance, supporting it, considering it as a strategic resource and understanding its opportunities.

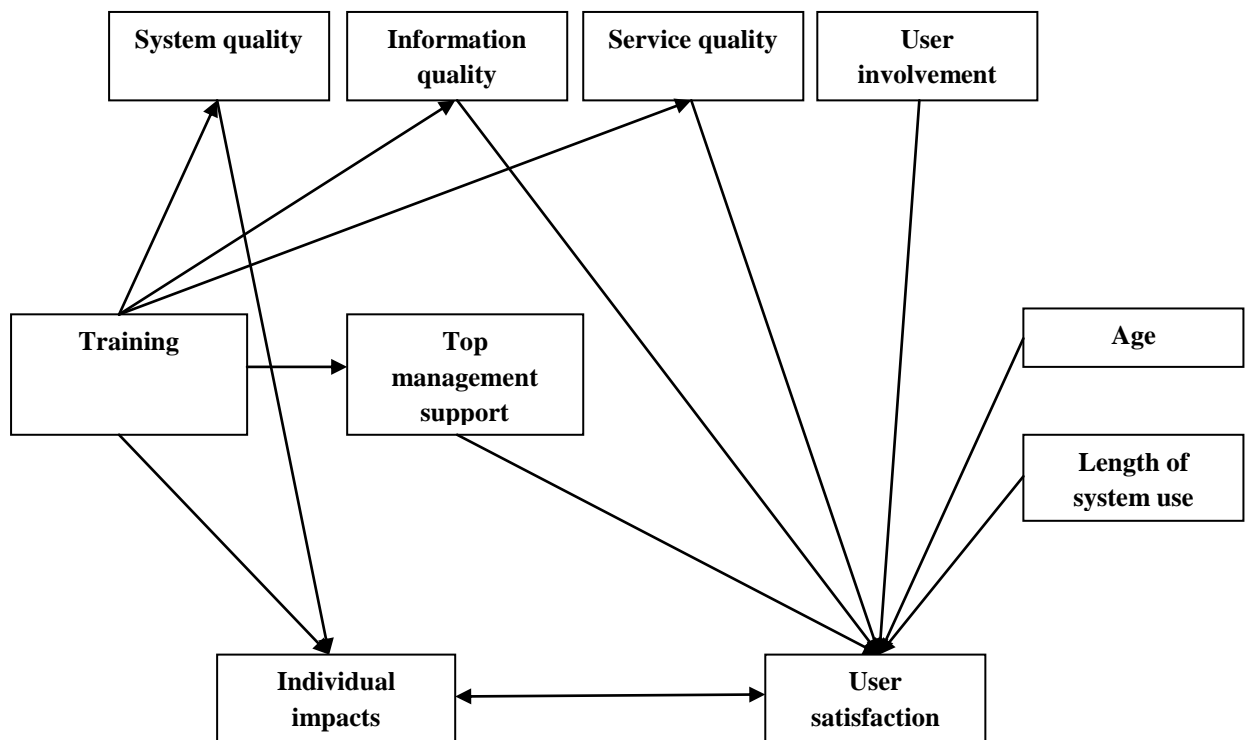
Finally, the low relationship between training and individual impact on task innovation is a new finding as well. This confirmed the important role training plays in banks because a higher level of training on the BIS beforehand may lead to higher level of individual job impacts on the task innovation level. A possible explanation for this finding could be that the more BIS training the older managers get, the more it helps them to be more creative and innovative and try out innovative ideas in their individual work which in turn improves their job performance in general.

User satisfaction has emerged in this study as a key link in the causal chain that leads from the factors affecting BIS success to the actual measurement of this BIS success, which are the individual impacts. In this model, user satisfaction was found to have a moderate effect on individual impacts on task productivity (0.304) and a strong effect on task innovation (0.395) only, implying that older managers with high levels of user satisfaction with BIS would have high impacts on individual job performance. These impacts would be reflected in accomplishing more work than would otherwise be possible, saving time, increasing productivity and helping to try out innovative ideas. Therefore, H10 was partially accepted.

Prior research supported this finding; however, there are relatively few studies that found weak or no relationships between user satisfaction and individual impacts. For example, Youths and Young (1998) found that user satisfaction was only weakly related to decision-making performance. Gelderman (1998) found the association was not significant, where the associations between system use and organisational revenues and profitability were not statistically significant in a survey of Dutch managers. Law and Ngai (2007) also found similar results in evaluating the relationship between user satisfaction and organisational performance of an ERP system.

On the other hand, individual impact on task productivity was found to have a moderate relationship with user satisfaction (path 0.283) meaning that more positive BIS effects on senior or older managers' job performance in terms of task productivity may lead to more satisfaction with BIS. Previous research supported this relationship (Yoon et al., 1995; Seddon & Kiew, 1996; Guimaraes et al., 1996; Abdul-Gader, 1997; Rai et al., 2002; Wu & Wang, 2006). Figure 6.6 shows the BIS success constructs in the older age group of bank managers and the relationships between them.

Figure 6.6 Relationship between dimensions of BIS success model for older bank managers



To summarise the findings of this model, it is noticed from Figure 6.6 that this model which is associated with older bank managers is more extensive than the previous two for middle and young age groups of managers. The findings here indicate that if older bank managers perceive a high level of information quality (e.g. information consistency, information age and timing) and if the managers perceive high levels of

BIS service quality (e.g. IS employees instil confidence in users, IS employees have the knowledge to do their job well), they will perceive high levels of user satisfaction, which in turn will influence their job performance. This user satisfaction is likely influenced directly by a number of factors such as age, length of system use, user involvement, top management support and individual impacts.

Level of training is a major contributor to this study in general and in this model in particular. Training, in the case of this study, refers to the adequacy of received BIS training and whether users were prepared to use the BIS when it was first used. Training was found to influence user satisfaction indirectly though influencing system quality, information quality and service quality.

6.3 Comparison between the three IS success age group models

The previous section presented the findings of this study which introduced three different IS success age group models in the context of banking industry. Each model had its own distinct IS variables and its own relationships between these variables and constructs. This section aims at comparing between the three proposed IS success age group models in terms of the existence of variables and the interrelationships between those variables and the influence of age differences in this comparison.

Firstly, the findings of this study revealed three IS success models for young, middle-age and older bank managers. The study has suggested several IS success constructs (independent variables) which may have an effect on user satisfaction and consequently on individual impacts. However, the data analysis revealed that the existence of these success variables differed from one age group model to another. Table 6.1 compares between the three age groups models in terms of the existence of success variables.

Table 6.1 Comparison between the three age groups in terms of success variables

IS success variables	Age group 1	Age group 2	Age group 3
Perceived system quality	✓	✓	✓
Perceived information quality	✗	✓	✓
Perceived service quality	✓	✓	✓
Age	✓	✓	✓
Formal level of Education	✗	✗	✗
Length of system use	✓	✓	✓
Training	✓	✓	✓
User involvement	✗	✗	✓
Perceived top management support	✗	✗	✓

✓: Statistical significance ✗: not statistical significance (hence removed from analysis)

From Table 6.1, we could notice the existence of the three quality items (system, information and service quality) in all the three models except for the perceived information quality which was not existed in the first model for young group of bank managers. This means that respondents in this age group did not capture the information quality variable which means that young age managers did not consider information quality variable as a separate IS success variable. In this regard, we could argue that perhaps this is because information quality is often considered as a key dimension of end-user satisfaction instruments (Ives et al., 1983; Baroudi & Orlikowski, 1988; Doll et al., 1994) and is often not distinguished as a unique construct but is measured as a component of user satisfaction. Therefore, capturing this variable is sometimes problematic for IS success research. However, more in-depth investigation about the relationship between age differences and IS constructs needs to be conducted in future research.

Nevertheless, the different items that constitutes the IS success variables differed from one age group to another despite having some similarities in other items. For example, the three groups considered confidence in the BIS and system language as the most important items of system quality. However, young and older managers considered response time, and system integration as other important items in perceived IS quality. Also, respondents in age group 2 and 3 considered information currency and timeless as important items of information quality, whereas middle-age managers added information reliability, accuracy and format of output, older managers added information completeness and relevancy for capturing information quality.

As for service quality, groups 1 and 2 agreed that tangibility dimension of service quality is important in perceiving service quality while groups 2 and 3 added assurance dimension to capturing the perceived service quality.

From the previous discussion, we may conclude that these differences in each model should be taken into consideration when designing new IS and/or developing existing ones and that CIOs and system designers and developers should benefit from these results in order to make sure that is users will use ISs, be satisfied with them and finally increase the positive and favourable impacts of IS on job performance.

Training level played a very important role in this study as it appeared in the three proposed models and had several direct and indirect relationships with different IS success variables in the three age groups. In group 1, results showed that perceived level of IS training had a positive relationship with system quality, service quality and user satisfaction. Middle-age managers considered IS training to have a positive influence on their perception of system quality, information quality and service quality. However, in group 3 of older bank managers, level of training showed interrelationships with system quality, information quality, service quality, top management support and individual

impacts. This comparison indicates that the important role of IS training increases when the age of users increase. This means that bank CIOs and IS developers should not ignore the importance of IS training on all levels of bank managers particularly on older managers as training could promote greater understanding and more favourable attitudes towards the system (Igbaria et al., 1995; Amoroso & Cheney, 1991; Cronan & Douglas, 1990; Sanders & Courtney, 1985; Schewe, 1976).

On the other hand, top management support and user involvement existed only as IS success factors in group 3 of older bank managers. This finding was unexpected as user involvement and top management support are considered important factors to ensure high quality systems as it increases system success through increasing system usage and user satisfaction with the system (Baroudi et al., 1986). Also, user involvement was reported to increase the chances of user acceptance and successful implementation because it helps tailor the system to meet users' perceptions (Franz & Robey, 1986; Watson et al., 1997). Whereas top management support is expected to directly affect IS success by increasing system use and user satisfaction with the system and the absence of that support is a critical barrier to IS use and the lack of some organisations' productivity has been attributed to it (e.g. Sabherwal et al., 2006; Brynjolfsson, 1993).

However, this finding could be due to that in Egyptian culture older employees are always close to top management for their long and good experience and for their long term service in the company. Therefore, top management support for ISs is an important factor to encourage this older age group (group 3) to use and be satisfied with the system. In addition, involving older bank managers in the designing and development of new and /or existing IS could also encourage them to feel safe and secure and to assure them that these ISs did not come to replace their jobs but on the contrary, involving them would make them accept the system and not resisting it.

Regarding the demographic variables, Hill et al. (1998) indicated that level of formal education is an extremely important factor that motivates behaviour in organisations, particularly the acceptance in change in technology in Arab societies. However, for the three age groups, formal level of education had an insignificant relationship with user satisfaction in terms of his/her perception of IS effectiveness, IS efficiency and of IS meeting his/her information needs and a moderate relationship between educational level and education and the fourth item of user satisfaction which was related to the overall satisfaction. A possible explanation for this finding could be that the formal educational courses (subjects) provided in different educational grades were not related to IS subjects. However, regarding the relationship with the fourth item of user satisfaction, a possible reason for this positive relationship with educational level could be due, in general, to higher educational level meaning a higher level of IT and computer command, which in turn could lead to some sort of overall satisfaction with IS.

In the three groups, the existence of a significant positive relationship between length of system use and two items of IS satisfaction (effectiveness and efficiency) could mean that when young, middle-age and older bank managers use BIS for a long time they overcome any techno-phobia they might have as they become more comfortable in using BIS, leading to an increase in their realisation of its effectiveness and efficiency, as it would be difficult to judge BIS without spending much time using it. In addition, the longer the managers interact with the BIS, the more likely that they will have positive attitudes towards it, which in turn could lead to increasing satisfaction levels.

Age is an important demographic factor in examining IS (Harrison & Rainer, 1992; Zmud, 1979), although there is some support for older employees reporting more favourable beliefs and outcomes in system usage (Ang & Soh, 1997). Prior research

strongly supported older employees as having less favourable beliefs and outcomes than younger employees (e.g. Harrison & Rainer, 1992; Nickell & Pinto, 1986). In the three groups, age had a positive relationship with perceived user satisfaction. A possible explanation for this finding is that younger managers' expectations from BIS are much higher than those of older managers, therefore the older the managers, the less their expectation from the BIS and, consequently, the more satisfied they would be and, vice versa, the younger the managers, the more their expectations from the BIS and thus the less satisfied they would be.

This explanation is consistent somehow with Egypt Information Technology Report (2009) which indicated that on an individual basis; only 9.3 million out of approximately 30 million of the older persons in Egypt had home computer access and used it at home. One of the main reasons senior citizens report for using a computer is to look for health information. On the other hand the report showed that the younger generations are getting more and more dependent on the computers and internet/web in performing daily activities (e.g. entertainment, shopping, studying).

Hence, in 20-30 years, the Egyptian society is more likely to experience a more dramatic increase in computer usage by seniors, making the study of aging issues effecting computer usage a necessity. One way to alleviate age-related barriers in using the computers and IS is by involving seniors in the IS design process.

Therefore, CIOs and IS designers should look for ways to increase the IS levels of satisfaction between young and middle-age groups of bank managers by meeting their IS expectations and requirements within different aspects of IS success factors.

To conclude, this section compared between the three IS success age group models in terms of the existence of success variables, their relationships with other variables and the influence of age differences from the Egyptian culture perspective. This section concluded that each model had its own success factors that should be taken into

consideration when designing new ISs and /or developing existing ones in order to make sure that IS users with different age groups will perceive high levels of user IS satisfaction which will lead to higher levels of favourable and positive impacts on job performance.

6.4 Implications of findings for the banking industry

The usage and non-usage of IT within the developed and non-developed world poses challenging problems for IS researchers and practitioners. While IT usage in the developed world has been well-studied, the study of strategic usage of IT in developing world is a relatively new field in which research is only just being established (Kamel, 1995; Rose & Straub, 1998).

In some countries poverty, trade barriers and lack of infrastructure constitutes massive constraints to IT usage (e.g. Goodman & Green, 1992). However, the usage of IT is not always constrained by resources alone. Where resources are available whether local or imported, non-usage of IT is still prevalent (e.g. Ibrahim, 1985).

Local usage of global systems may be affected by local politics and culture. For example, local usage of Geographical Information Systems in India is affected by cultural attitudes to maps and cartography. Using maps is not seen as important in a country where it is usually easier to ask someone for directions (Walsham, 2001). In China, a reliance on intuition and informal approaches to managerial decision making debilitates against the effective use of management information systems (Hempel & Kwong, 2001). In Malaysia, the cultural view of computer systems as symbols of power limits their use to senior figures in authority (Walsham, 2001). In Egypt, the government has a history of pursuing IT initiatives and promoting IT usage in the public and private sectors. Recently it has begun to pursue e-government and geographical information system projects as well. However, the nature of Egyptian culture may inhibit the effective use and adaptation of this technology.

Since effective usage of IT is important for economic advancement in developing countries and the delivery of benefits from IT deployment in organisations and IT usage is clearly affected by local cultural conditions, it is important to develop an understanding of the factors that drive local usage in order to benefit from global information systems.

It is indicated in this research that each research model had its own BIS constructs and that relationships between these constructs affect end-user satisfaction with the BIS, which in turn affect user's individual job performance. Overall, the study serves to increase our understanding of the conceptual IS success of the banking industry and helps to provide a better understanding of the nature of demographic influences.

This study extends the updated DeLone and McLean (2003) IS success model and helps to quantify the importance and value of human elements (demographic and situational variables) and contributes to our overall understanding of the mechanism by which these human elements, in addition to the technical elements, influence the level of user satisfaction and individual impacts in the banking industry. Perhaps this is the main contribution to this study, as most of previous IS success models in different contexts focused heavily on the technical aspect of ISs either on the technical attributes of the system and/or the output of these systems. However, little research has been done on the effect of differences in user characteristics and situational or contextual variables in the design of new and/or developing IS in the banking context. Thus, this study has tried to fill the possible human element gap in the DeLone and McLean model by adding some demographic and situational variables, which had an effect on BIS satisfaction and finally led to favourable job performance.

From an academic point of view, the study findings asserted strongly the importance of system quality, information quality, service quality, training, user involvement, top

management support, age, length of system use and user satisfaction. However, this importance differed between the three research models as some variables were more important in one model more than in the others and some variables did not even exist in some, e.g. information quality did not exist in model 1. In addition, there were differences in the indicators that identify different constructs, e.g. service quality dimensions varied from one model to another and some dimensions did not exist in the three models such as responsiveness, empathy and reliability. This means that BIS developers and designers should concentrate on including tangibility and assurance dimensions as important service quality indicators when introducing BIS service.

New relationships were tested and supported in this study, for example the positive direct relationship between system quality and individual impacts in the first and second models, the positive direct relationship between information quality and individual impacts in the second and third models and the direct relationships between service quality and individual impacts in the three models. These findings indicate the importance of the three main constructs (system, information and service quality) in their direct relationships with individual impacts.

The study also confirmed the importance of differences in age groups between BIS users and that these differences should be taken into consideration when CIOs, BIS designers and developers design new or develop existing BISs. This finding supports previous research which indicated that age is an important variable in the management of IT and in banking research (Simmers & Anandarajan, 2003).

User satisfaction was a very important mediate variable between IS success variables and dependent variable in this study, individual impacts. However, this variable was identified differently in the three models. It was identified in the young age group of bank managers as perception of IS effectiveness, meeting their information needs and

overall satisfaction with the system. The middle age group identified it as perception of IS effectiveness, efficiency and meeting their information needs and finally the older group identified it as perception of IS effectiveness and efficiency.

Given that banks invest millions in BIS software and BIS training programmes, justifications of these expenses would then be a significant issue. In order for banks to ensure that these expenses are well spent, they need to measure and evaluate the systems constantly and make sure that these systems increase the bank's success either on the individual, organisational or any other level.

The study findings provide the banking industry with a tool which can be used as a basis to design and develop new or existing BISs that could lead to increasing the individual job performance at the bank managers' level.

The study findings presented three research models; each is related to a certain age group of bank managers which means that BIS designers should divide the target bank managers into three age groups. Each research model has its own variables representing the specific nature of this model's age group of respondents. There are some similarities between the three models; however, there are considerable differences as well. There are novel relationships proposed in this study, few are rejected and most of them are accepted.

User training (situational variable) is one of the major contributions in this study, as it has a direct impact on perceived system, information and service qualities, as well as a direct influence on user satisfaction in the first model and on individual impact and top management support in the third. This finding implies the importance of BIS training on the dependent variable in this study (individual impacts) to the entire three research models which means that more BIS training should be given to BIS users of the banking industry, regardless of their age group.

The situational variables such as top management support and user involvement are important factors for system success; however, the importance of these factors is highly apparent in the third model with positive correlation with older employees' satisfaction. This finding means that to older bank managers, more user involvement, participation in the BIS design and more support of top management for BIS (e.g. top management involvement in BIS is strong, top management is interested in BIS, top management considers BIS as a strategic resource) would increase their levels of user satisfaction with BIS.

On the other hand, this study reflects the importance of a user-centered perspective. The results in this study clearly show that individual differences are important in understanding how and why people make different choices. The findings within different age groups help us to see the different IS factors for people of different ages. Age/ gender and length of system usage were found to have a positive correlation with user satisfaction in the three research models. This finding has a considerable implication for the banking industry, indicating that young bank managers tend to be less satisfied than middle and older age group managers, which means that more efforts should be directed towards young managers (and possibly middle managers) to gain their BIS satisfaction. The influence of length of system use on user satisfaction indicate that duration of BIS use should be more stable in banks as longer use could mean more BIS satisfaction levels.

To conclude, this study has proposed a theoretical model of IS success in the banking industry context. By using Structural Equation Modelling (Partial Least Squares), this theoretical IS model was divided into three according to the age of the bank managers. Perhaps the main contribution of this study is the development of those three research BIS success models based on age group differences. This study aimed to meet one

research objective with its related research questions and hypotheses. The objective was to propose a model which investigates the success of ISs in the banking industry. This objective was met by proposing three conceptual models by which an investigation of BIS success was conducted in Egypt.

However, there could be other, more complex effects that could explain the relationship between the successes constructs at either the individual or organisational levels of analysis. Future research may consider complex functions, such as curvilinear effects, that affect the relationships among IS success constructs (Petter et al., 2008). There are also a number of boundary conditions deserving attention, such as the timing of success measurements (e.g. the difference between the time of IS implementation and the time of IS measurement) and the type of IS examined.

6.4 Summary

This chapter presented the discussion, key findings and significant relationships in the three research models in relation to the research objective and related research questions framed for the study. This is followed by discussion of the results in the light of the implications for the banking industry.

Chapter 7

Conclusions, Contributions, Limitations and Future Research

7.1 Introduction

This chapter assesses the main conclusions of this study in the light of the research objectives and questions. It is divided into four sections. The first section presents an overview of the purpose of the study and summarises the main findings. The second discusses the contributions of the study and the managerial implications. The third section discusses the limitations of the study and, finally, the fourth section deals with the possible avenues of future research based on the results of the study.

7.2 Conclusions

As the banking industry in Egypt enters the new information age, its investments in and usage of IS are expected to increase. In order to get the required resources needed to invest in these ISs, banking organisations need to justify the expense by providing clear evidence that they will increase and improve the job performance of bank managers. This process requires an investigation of IS success in banking. In other words, what are the appropriate dimensions for evaluating the success of BIS? And what are the relationships between these dimensions? That is where this study comes into play.

Focusing on how to evaluate BIS success, this study helps to fill the gap in the research literature by proposing a conceptual model for examining this success. By reviewing the IS literature, several empirically tested measures of IS components were revealed, as well as a very limited number of studies providing theoretical models for examining IS success in the banking industry.

DeLone and McLean's (1992, 2003) IS success models appeared as one of the most comprehensive. Also, it has received support from numerous empirical studies.

Therefore, this model was used as a conceptual foundation for this research. This study adopted the updated 2003 model and added some demographic and situational variables in an attempt to propose a theoretical IS success model to investigate BIS success in Egypt.

- **Summary of findings**

The study revised the proposed research model more than once. The first time was after the telephone interviews and the second time after the descriptive analysis of the data. The study used data collected by a survey questionnaire with a total of 257 usable responses. Several statistical techniques were used to test the research hypotheses and to answer the research questions. The proposed research model was classified into three research models of bank managers differentiated by age groups.

Initial findings of this study reported different results in each research model. As for the young age group of bank managers, Figure 6.2 showed that system quality, age and length of system use influence user satisfaction. System and service quality had a direct effect on individual impacts. User satisfaction had a mutual relationship with individual impacts, which means that bank management should benefit from this mutual relationship by developing banking decision systems, using expert systems and computer networks for electronic information exchange, to increase BIS satisfaction and consequently increase managers' job performance.

Also, this mutual relationship asserts the importance of flexibility in designing and implementing BISs, as it is important to continually evaluate the IS satisfaction and have the flexibility of changing BISs when required.

Unexpectedly, the findings did not support the relationship between information quality, service quality and user satisfaction. However, an interesting finding was that level of

training had a direct relationship with system quality, service quality and user satisfaction.

As for the middle age group of managers, Figure 6.4 showed that information quality, service quality, age and length of system use had an effect on user satisfaction. On the other hand, system, information and service quality were found to have a direct effect on individual impacts. User satisfaction had a mutual relationship with individual impacts. Findings revealed that level of training had a direct relationship with system, information and service quality.

Regarding the older age group of bank managers, Figure 6.6 showed that information quality, service quality, user involvement, top management support, age and length of system use had a direct effect on user satisfaction. System quality had a direct effect on individual impacts. Contrary to our expectations, findings did not support the relationship between system quality and user satisfaction. User satisfaction also had a mutual relationship with individual impacts. However, level of training had a direct effect on system, service and information quality, top management support and individual impacts.

From the previous summary, it was found that system, information and service quality, level of training, age, length of system use, user involvement and top management support were the main predictors (success constructs) of user satisfaction and individual impacts in the three proposed research models. However, the relationships between these constructs varied according to each age group of managers. Perhaps the most common construct in the three models is level of training. Training was found to have an influence on the young age group of bank managers in their perceptions of system and service quality and user satisfaction. In the middle age group, it had an effect on their perceptions of system, information and service quality. Finally, in the older age

group of managers, it had an effect on their perceptions of system, information and service quality and on top management support and individual impacts. Consequently, level of training needs to be taken strongly into consideration, plus the other constructs, in designing and developing IS in the banking context. This means that bank CIOs will need to extend IS training programmes to include all levels of bank managers and employees in all functional activities and to consider outsourcing BIS training to a third party to provide the required and adequate IS training for bank managers.

Overall, this study proposes three research models of evaluating banking IS success based on the updated DeLone and McLean (2003) IS success model with the addition of other demographic variables and two revision steps derived from prior stages of analysis. This study confirmed the validity of extending the applicability of the adapted DeLone and McLean (2003) model to predict the actual usage and satisfaction of BIS in less developed country.

To conclude, this study makes significant progress in our understanding of IS success in the banking industry. It provides readers with a volume of information regarding IS success constructs and predictors and the relationships between those constructs and antecedents to BIS success. It is imperative that practitioners understand the complex relationships between different constructs and the contextual environment in which these IS systems exist to be able to plan and develop successful IS. This study also indicates the importance of taking into account additional factors when examining IT/IS success. In particular, many aspects of culture, not only defined as cultural characteristics, but also influenced through top management support, organisational characteristics and the background and characteristics of the end-users will strongly influence the perception of ISs.

7.3 Contributions and implications of study

This section shows the key academic and methodological contributions of the study as follows:

7.3.1 Academic contributions

1. Proposed conceptual model of banking information system success

This study adds to IS literature by adding and confirming certain links in the DeLone and McLean (2003) updated IS success model highlighting the dimensions of banking IS success and explaining the nature of interrelationships between them. As discussed in section 4.3, BIS success partly depends upon the degree of use (Poston & Speier, 2005), which itself may be tied to system quality, information quality, service quality, user satisfaction and system usefulness. Thus, the technological dimensions (e.g. system, service and information quality) and the human dimensions (e.g. user satisfaction, perceived system benefits, user involvement, user training and system use) can be a good starting point when considering suitable constructs for measuring BIS success. In this context, in investigating IS success, this study selected some demographic (age, education, tenure in the job, organisational level, training, length of system use) and situational variables (top management support, user involvement) affecting system usage and user satisfaction to be added to the adopted DeLone and McLean (2003) model as possible determinants of BIS success. The selection of these variables was based on the existence of literature supporting their relevance as likely determinants of system success.

This study supports the notion that differences in individual characteristics (e.g. gender, age, education, organisational level) could have significant effect on IS design, satisfaction and use (Zmud, 1979; Dickson et al., 1977). Thus, this study found differences between the three proposed models regarding individual differences and also

found that age was one of the most important demographic variables, with a great effect on user satisfaction and job performance.

The study also supports the previous research which indicated that age is an important variable in the management of IT in general and of IS specifically (Simmers & Anandarajan, 2001). This study found differences in age groups by which the proposed models were differentiated accordingly (young, middle age and older managers). Each model has its own IS success constructs and its relationships. This means that bank CIOs and IS developers and designers should take these age differences into consideration when designing and/or developing any BIS by providing, for example, a variety of IS outputs which have different styles and content to be suitable for different age groups of bank managers. Also, training and user involvement programmes should consider these differences when planning the appropriate training plans for bank managers by motivating bank managers to participate and get involved in the design and implementation of BISs and in determining the format and content of BIS output which meet their information needs. Training programmes should also identify and distinguish between the training requirements for different age groups when implementing these programmes.

2. Extension of DeLone and McLean (2003) IS success model

A second academic contribution of this study is that it extends the DeLone and McLean (2003) IS success model. DeLone and Mclean (1992) suggested that the observed empirical relationships among the constructs of IS success might be due to the exclusion of other factors affecting them. This problem could be solved by examining IS success along with its potential determinants.

However, these potential determinants or variables could be identified into three groups of user- related variables investigated in IS research: (1) cognitive style (e.g. complex/simplex, intuitive/ analytic, heuristic/systematic), (2) personality type (e.g. tolerance of ambiguity, field dependent/independent) and (3) demographic factors (e.g. age, gender, profession, education, user experience, attitude towards IS organisational position) (Zmud, 1979). Zmud (1979) indicated that, compared with the other two groups, fewer studies investigating demographic variables have been conducted. Therefore, this study has tried to fill the possible human element gap in the DeLone and McLean model by adding some demographic and situational variables, which may have an effect on system usage and satisfaction with the system and finally may lead to favourable job performance.

This study extends the DeLone and McLean (2003) IS success model by demonstrating how demographic and situational variables indirectly affect individual impacts by influencing end-user satisfaction with BIS. This extension of the DeLone and McLean model is significant and should be transferable to research projects that aim to identify what and how other variables of BIS can influence individual impacts. This extended model could be transferable to other different IS contexts such as other service industries (e.g. hospitals, hotels, travel agencies and on-line learning) and public organisations (e.g. government ministries).

3. Study conducted in Egyptian banking industry

A significant contribution of this study was the development and testing of the model of system success in the banking industry. As discussed in section 3.5, research exploring this success is very scarce. As discussed in sections 2.2 and 2.3, the changing financial environment in the banking sector has witnessed significant changes. The role and number of IT investments have increased in the Egyptian banking industry; while there

has been a significant rareness of research investigating the success of IS to justify these expenditures. Certain constructs used in prior studies were replicated in this study: system quality, information quality, service quality, user satisfaction and system use. In view of the above, this research attempts to understand the determinants of banking IS success in Egyptian banks from managers' perspectives.

7.3.2 Methodological contributions

The methodological contributions of the study are as follows:

1. Use of Structural Equation Modeling (SEM) with Partial Least Squares (PLS)

This study attempts to identify the factors affecting BIS success and to understand the nature of interrelationships between different variables of the proposed model. These interrelationships are explored both directly and indirectly through influence on user satisfaction and consequently on individual impacts. By using PLS, it was possible to create three models depicting significant paths or relationships among variables, which could prove valuable for understanding the complexity of the process of investigating BIS success.

2. Generalisability

Although the study is made in the Egyptian banking industry, its results could be generalised cautiously beyond the context of the study in terms of industry and country. The research can be extended to other banking industries in other countries where ISs constitute a major part of them. This study could also be applicable to other service industries (e.g. hotels, hospitals and insurance companies) in similar countries. However, generalisation of the results for Egypt to the rest of the Arab should be taken with cautious and not for granted. While Hofstede (1997) grouped all Arab countries in one category, each country still has its own unique social, political, and cultural structure.

7.3.3 Implications of study

In the context of ISs, this study contributes to IS literature in several ways. Firstly, to the conceptual side of IS success by proposing models for evaluating BIS success. Consequently, this study is an additional step in developing a theory of IS evaluation in the service sector in general and the banking industry in particular.

Secondly, it contributes to the practical side of ISs. This study offers a number of useful insights to banking practitioners who were always being challenged to justify the IT/IS investments in their banks and to evaluate the success of BIS.

The study's findings are especially relevant for bank CIOs, software designers and developers, operators and service providers looking for ways to plan, approach and improve BIS developments. This study clearly shows that users' age differences play a significant role in determining IS success constructs and suggests that supposed differences between genders should rather be interpreted with regard to age differences. Hence, practitioners can gather information from this study regarding banking system success, apparent age differences and fit for developing BIS success. For example, they can design and/or develop BIS, taking into account the different indicators of BIS quality which varied from one age group of bank managers to another. Also, they should provide a variety of BIS outputs which have different information styles and content which could suit different age groups of bank managers.

From a practitioner perspective, this study also supports the importance of system quality, information quality and service quality, level of training, user involvement, top management support, age and length of system use as significant predictors of user satisfaction and individual impacts. Without these important elements, BIS success would probably get low success impacts. Level of user training emerged during the study as the most influential novel factor in the three BIS success models. Thus,

banking organisations should provide adequate IT/IS training programmes for bank managers at all levels. Also, when a BIS designer or developer gets involved in designing and/or developing a system, he/she should be aware of the classification of the target BIS users according to age groups, as each has its own factors affecting user satisfaction and consequently job performance.

Findings of this study provide guidance on how bank managers may influence the BIS success within banks. As findings indicated, user satisfaction is a key variable in the three BIS success models. The study suggests that as satisfaction increases, individual impacts also increase. Therefore, bank managers can positively influence BIS success through increasing the entire success constructs which are positively related to user satisfaction in an attempt to increase individual impacts and achieve the BIS success.

Another contribution of this study is testing in a Middle Eastern country (Egypt), three models, instruments and a research process that were based on previous research in the USA, as the diffusion of IT/IS in many less-developed countries in regions such as Africa, Asia and Latin America has been extremely low (Igbaria et al., 2002). However, with the expansion of global trade, these countries began recognising the significance of IT/IS but its adoption by organisations does not necessarily confer on them the benefits which could only result from its effective usage. Therefore, the differences in timing of IT/IS adoption and diffusion could make previous research in the USA and European countries not applicable in other countries with different technological and economic factors.

The study's findings had some similarity with those in the USA and European countries and had some differences as well regarding the constructs and relationships in the study models. For example, some dimensions of service quality did not exist in the three

models such as reliability, responsiveness and empathy. Hence, this study enhanced the external validity of the models, concepts and instruments.

In summary, this research study offers a number of useful insights to BIS practitioners. It provides three research BIS success models that can be used to examine IS success in the banking industry. The study provides insight as to how demographic and situational variables are important for the BIS success. Finally, it gives bank practitioners a new way to think about their BIS end-users. Hopefully, attention will continue to be directed away from the development of more tools and techniques and towards understanding the social context of IS development and use. Practitioners should be made aware of the potential for almost any project to be vulnerable to the attribution of failure and hence must acknowledge the highly political process surrounding IS.

7.4 Limitations of study

By their nature, surveys have several potential weaknesses and discussion of the study limitations is necessary. By keeping the limitations in mind, future research may be more clearly directed. One main limitation is the typically low response rate of surveys. Low response rates are problematic as they reduce confidence about the extent to which survey findings generalise from the population on which the survey was based (Snow & Thomas, 1994). Response errors were another problem because of ambiguous wording and the inherent lack of interactivity (Pinsonneault & Kreamer, 1993). It has to be remembered that Trochim (2001) indicated that questionnaires were not the best vehicle for detailed written responses. However, in this study, the response rate was 44% which was acceptable.

This study focused only on heavy IS users and educated users (bachelor degree and more). System use was dropped from the model as all users were heavy users and less educated users (less than bachelor degree) were also dropped.

The population of this study included bank managers in the Egyptian banking industry. A sample of 580 participants was drawn from the population from 25 banks and bank branches by using a convenience sampling technique and these banks were also selected using convenience sampling. Because of the nature of the sample and the methods used to select participants and banks in terms of demographics, the findings of the study could be generalised to the study's population, that is Egyptian banks, and possibly to similar banking contexts in the Middle East region and other similar countries in different regions such as Africa, Asia and Latin America.

Likert scales were used to measure the participants' perceptions. Therefore, the measures were subject to the respondents' interpretation of the questions. Pilot study was used to minimise this problem. Future studies need to take care of interpretation problems. Additionally, Likert scale measurements could lead to response bias, as participants do not always answer honestly and could try to avoid the extreme ends of the scale.

The gender difference among aged people noted in some recent studies (e.g. Morris et al, 2005) was not examined in our study. Therefore, we suggest that future research deeply should investigate IT with different demographic profiles of end-users.

Another limitation was related to the data collection method. The survey questionnaire was the only instrument used to collect data from the study's subjects. Thus a large part of the reliability of the collected data depended on respondent attention to detail when answering. Although reasonable precautions were taken to eliminate any threat to the reliability of the data (e.g. meeting with the respondents before the questionnaires were distributed, giving the respondents all the time they needed to complete the questions and obtaining the advance approval of upper management), it was impossible to guarantee the reliability of the data if the survey questionnaire was the only instrument

used for data collection. Because the focus was limited to Egyptian banks only, the external validity of the research's findings was limited, to a great extent, to that sector. External validity refers to the generalisability of the research finding to other populations, settings and measurement arrangements (Kidder & Judd, 1986). However, there were no special characteristics about the Egyptian banking sector to make it unique and different from any other service sector in Egypt or from any banking sector in any other country in the Middle East region. Consequently, the findings of the present research may be generalised to other types of service organisations or to other similar countries in different regions of the world.

The current study was conducted at the individual level. This individual single approach to the study reduced the complexity of the research method. However, such an approach limited the outcomes of the research. A single-level theory/approach did not consider the possibility that a finding at one level of analysis may have implications at another level (Dansereau et al., 1984).

Another limitation was that the current study tested part of the updated DeLone and McLean (2003) model in addition to only some user-related and context-related factors which the literature stated may have an effect on IS success.

7.5 Future research

The research on IS success has a long tradition and will continue as long as IS investments exist and organisations want to use this IS in an effective way. This study indicated the importance of cultural influences on IS usage and satisfaction. However, there will be a need to expand the repertoire and depth of cultural models which provide the basis for exploring IS adoption and usage amongst different countries. There are other cultural attributes such as criticism avoidance, respect; consideration and patronage need to be considered. Hence attention should be paid to developing richer

cultural constructs which may give deeper understanding of the cultural determinants of IS adoption and usage. In addition, models of power should be explored and power constructs developed in order to understand and test the influence of power on IS adoption across cultures.

Other several areas and opportunities for future research are suggested by the findings of this study. Firstly, although this study has provided needed empirical support for the three BIS success models, broader empirical support is needed. Also, since there are commonalities between different sectors in the service industry and since these models were developed from concepts that are widely applicable, future research should test the applicability of these models in other different types of service industries with different organisational cultures to determine if the factors that increase user satisfaction and individual impacts are common across industries with small and medium-sized organisations.

Secondly, this study represented one of the first steps in developing an IS success model in the banking industry. Therefore, a logical extension of this study is to add new additional user and context-related/ demographics variables. For example, the study could be replicated using additional variables such as user conflict, types of decisions, types of systems, system usefulness, system resistance, task complexity, system complexity and intention to use. Future research should examine other external factors such as social or cultural factors.

Thirdly, this study used quantitative methods and only questionnaires for collecting data. Future research should also benefit from some kind of triangulation such as using qualitative methods to gain more in-depth insights into the aspects of IS success and/or a case study approach. For example, IS users' observation and in-depth interviews with IS users would give important information related to their IS satisfaction instead of just

asking them questions about their perceived satisfaction. Also, reviewing secondary data like productivity reports of individuals could give more information about the individual impact variable.

Fourthly, in this study, system use was dropped from the models because respondents were heavy users of the system although system use was not mandatory. Therefore there was not much variability between users to justify including it. Thus, future research should consider the variability in system usage which may lead to include system use in the models. Future research may also consider replicating the study in a mandatory IS usage context as it may reveal new constructs.

This study tested banking IS success on the individual level only. Thus, future research should consider extending these models to include organisational impacts, social impacts and other impacts to gain more insights into the effects of IS at all levels. The sample for future research may be expanded to bank employees too to capture the characteristics from all banking IS users including e-banking customers as well.

Another stream of future work could explore the role of epistemology and methodology in conducting gender and IS research using the Individual Differences Theory of Gender and IS. Also the contribution of organizational factors to the underrepresentation of women in IS by focusing on the articulation of workplace factors that enhance and inhibit women's participation in IS work and women's varying responses to them could be explored.

Finally, this study focused on testing direct linear relationships between variables. Future research could focus on testing the curved nonlinear relationships in order to get insightful information about the actual nature of relationship between variables in the real world. Also, future research should benefit from developing new measurements or proxies for success constructs.

References

- Abdul-Gader, A. (1997) Determinants of Computer-Mediated Communication Success among Knowledge Workers in Saudi Arabia, *Journal of Computer Information Systems*, **38** (1), 55-66.
- Abu-Musa, A. (2003) Egyptian Banking Industry: Its History and Future, *Journal of American Academy of Business*, **3** (1/2), 44-52.
- Adham, K. (1999) *The Adoption and Implementation of Information Technology in Malaysian Commercial Banks: Phone Banking and Electronic Terminal Banking System*, Doctoral Thesis, Rensselaer Polytechnic Institute, Troy, New York.
- Adams, D., Nelson, R. and Todd, P. (1992) Perceived Usefulness, Ease of Use and Usage of Information Technology: A Replication, *MIS Quarterly*, **16** (2), 227-247.
- Adamson, I. and Shine, J. (2003) Extending the New Technology Acceptance Model to Measure the End User Information Systems Satisfaction in a Mandatory Environment: A Bank's Treasury, *Technology Analysis & Strategic Management*, **15** (4), 441-455.
- Adler, P. and Ferdows, K. (1990) The Chief Technology Officer, *California Management Review*, Spring, 55-62.
- Advisory Board Company (1997). *Valuing IT Investments*: In: *Defence of Quantitative Analysis*.
- Agarwal, R. (2000) Individual Acceptance of Information Technologies, In Kim, Y.J.(2000) *Measuring Web-based Business to Business Support System Success Based on User Satisfaction*, Doctoral dissertation, State University of New York.
- Agourram, H. and Ingham, J. (2007) The Impact of National Culture on the Meaning of Information System Success at the User Level, *Journal of Enterprise of Information Management*, **20** (6), 641-656.

- Aladwani, A. (2002) Organisational Actions, Computer Attitudes and End-User Satisfaction in Public Organisations: An Empirical Study, *Journal of End User Computing*, **14** (1), 42-49.
- Albers, S. (2008) PLS and Success Factor Studies in Marketing. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) *The Use of Partial Least Squares Path Modeling in International Marketing, Advances in International Marketing*, 1-43.
- Al-Gahani, S. (1998) Responses: Definition of IT, [Online], Available from <http://www.commerce.uq.edu.au/isworld/research/msg.02-12-1998.html> [Accessed 13/2/2006].
- Al-Gahtani, S. (2004) Computer Technology Acceptance Success Factors in Saudi Arabia: An exploratory Study, *Journal of Global Information Technology Management*, **7**(1), 2-29.
- Ali, J. (2004) Information Technology in the Middle East, *Journal of Global Information Technology Management*, **7** (1), 1-4.
- Al-Janaee, A. (1989) *An Investigation of Leadership Style and its Effect upon Employee Motivation and Satisfaction with Supervisors in Public and Private Organizations in Kuwait*, Doctoral Thesis, University of Denver, Denver, CO.
- Allen, D., Kern, T. and Havenhand, M. (2002) *ERP Critical Success Factors: An Exploration of the Contextual Factors in Public Sector Institutions*, Proceedings of the 35th Hawaii International Conference on System Science, [Online], Available from www.IEEE.org [Accessed in 1/4/2009].
- Al-Mashari, M. (2000) *Constructs of Process Change Management in ERP Context: A Focus on SAP R/3*, Americas Conference on Information Systems, Long Beach, California.
- Al-Mashari, M. and Zairi, M. (1999) BPR Implementation Process: An Analysis of the Success and Failure Factors, *Business Process Management Journal*, **5**, 87-107.

- Almutiari, H. (2001) *Evaluating Information System Success in Public Organizations: A theoretical Model and Empirical Validation*, Doctoral Thesis, Pennsylvania State University.
- Almutiari, H. and Subramanian, G. (2005) An Empirical Application of the DeLone and McLean Model in the Kuwaiti Private Sector, *The Journal of Computer Information Systems*, **45** (3), 113-122.
- Almutiari, H. (2007a) Information System and Productivity in Kuwait Public Organisations: Looking Inside the Black Box, *International Journal of Public Administration*, **30**, 1263-1290.
- Almutiari, H. (2007b) Determinants of Information System Usage in Public Service Organisations: A Structural Equation Investigation, *International Journal of Management*, **24** (3), 436-453.
- Alter, S. (1999) *Information Systems: A Management Perspective*, 3rd Edition. New York: Addison-Wesley.
- Alter, S. (2000) The Siamese twin Problem: A Central Issue Ignored by Dimensions of Information Effectiveness, *Communication of AIS*, **2** (20), 1-55.
- Amoako-Gyampah, K. and White, K. (1993) User Involvement and User Satisfaction: An Exploratory Contingency Model, *Information and Management*, **25** (1), 1-10.
- Amoli, E. and Farhoomand, A. (1996) A Structural Model of End- use Computing Satisfaction and User Performance, *Information and Management*, **30** (2), 65-73.
- Amoroso, D. and Cheney, P. (1991) Testing a Causal Model of End-user Application Effectiveness, *Journal of Management Information Systems*, **8** (1), 63-89.
- AnaKwe, U., Anandarajan, M. and Igbaria, M. (1998) Information Technology Usage Dynamic in Nigeria: An Empirical Study, *Journal of Global Information Management*, **7** (2), 13-21.
- Andrews, D., Preece, J. and Turoff, M. (2001) *A Conceptual Framework for Demographic Group Resistance to Online Community Interaction*, Paper presented at the HICCS 2001 Conference, Honolulu, HI.

- Ang, J. and Pavri, F. (1994) A Survey and Critique of the Impacts of Information Technology, *International Journal of Information Management*, **14** (2), 122-133.
- Ang, J. and Soh, P. (1997) User Information Satisfaction, Job Satisfaction and Computer Background: An Exploratory Study, *Information and Management*, **33** (5), 255-266.
- Apigian, C., Ragu-Nathan, B., Ragu-Nathan, T.S. and Tu, Q. (2004) A Path Analytic Study of the Effect of Top Management Support for Information Systems Performance, *Omega*, **32** (6) 459-461.
- Arbuckle, J. and Wothke, W. (1999) *AMOS User's Guide*, Version 4, Small Waters Corporation, Chicago.
- Babbie, E. (2004) *The Practice of Social Research*, Thomson/ Belmont, Wadsworth, CA.
- Bacon, L. (1997) *Using AMOS for Structural Equation Modeling in Market Research*, SPSS White Paper by L. Bacon and Associates, Ltd. and SPSS Inc. [Online] Available from: <http://www.SPSS.com> [Accessed 14/12/2008].
- Bagozzi, J. (1994) Structural Equation Models in Marketing Research: Basic Principles. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Bailey, J. and Pearson, S. (1983) Development of a Tool for Measuring and Analyzing Computer User Satisfaction, *Management Science*, **29** (5), 530-545.
- Bajwa, D., Rai, A. and Brennan, I. (1998) Key Antecedents of Executive Information System Success: A Path Analytic Approach, *Decision Support Systems*, **22** (1), 31- 43.
- Balian, E. (1982) *How to Design, Analyze, and Write Doctoral Research: The Practical Guidebook*, New York: University Press of America.

- Ballantine, J., Bonner, M., Levy, M., Martin, A., Munro, L. and Powell, P.L. (1996) A 3- D Model of Information Systems Success: The Search for the Dependent Variable, *Information Resources Management Journal*, **9** (4), 5-14.
- Banking Guide, 2007, [Online], Available from, <http://www.banking-guide.org.uk/> [Accessed 18/2/2007].
- Bao, J. (2002) *Computer Internet – the elderly have interests*. [Online], Available from http://www.jwb.com.cn/big5/content/2001-02/12/content_8540.htm, [Accessed 4/10/2009].
- Barclay, D., Higgins, C. and Thompson, R. (1995) The Partial Least Squares (PLS) Approach to Causal Modelling: Personal Computer Adoption and Use as an Illustration, *Technology Studies, Special Issue on Research Methodology*, **2** (2), 285-309.
- Barki, H. and Huff, S. (1985) Chang, Attitude toward Change, and Decision Support System Success, *Information and Management*, **18** (9), 261-268.
- Barki, H. and Hartwick, J. (1989) Rethinking the Concept of User Involvement, *MIS Quarterly*, **13** (1), 53-63.
- Barki, H. and Hartwick, J. (1994) Explaining the Role of User Participation in Information Systems Use, *Management Science*, **40** (4), 440-465.
- Baroudi, J., Margrethe, H. and Olson, B. (1986) An Empirical Study of the Impact of User Involvement on System Usage and Information Satisfaction, *Communication of the ACM*, **29** (3), 232-238.
- Baroudi, J. and Orlikowski, W. (1988) A Short-form Measure of User Information Satisfaction: A Psychometric Evaluation and Notes on Use, *Journal of Management Information Systems*, **4** (4), 44-59.
- Belcher, L. and Watson, H. (1993) Assessing the Value of Conoco's EIS, *MIS Quarterly*, **17** (3), 239-261.
- Bender, D. (1986) Financial Impact of Information Processing, *Journal of Management Information Systems*, (4), Spring, 22-32.

- Benjamin, R. (1982) Information Technology in 1990^s: A Long Range Planning Scenario, *MIS Quarterly*, **6**, Spring, 11-31.
- Benjamin, R., Dickinson, C. and Rockart, J. (1985) Changing Role of the Corporate Information Systems Officer, *MIS Quarterly* (September), 177-88.
- Bennatan, E. (2000) *On Time within Budget. Software Management Practices and Techniques*, 3rd Edition, John Wiley and Sons Inc., USA.
- Berg, M. (1999) Patient care information systems and health care work: a sociotechnical approach, *International Journal of Medical Informatics*, **55**, 87-101.
- Bernroider, E. (2008) Information and IT Governance for Enterprise Resource Planning Supported by the DeLone and McLean Model of Information System Success, *Management*, **45**, 257-269.
- Beynon-Davies, P. (1999) Human Error and Information Systems Failure: The Case of The London Ambulance Service Computer-aided Despatch System Project, *Interacting with Computers*, **11** (6), 699-720.
- Bharadwaj, A. (2000) A Resource-based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation, *MIS Quarterly*, **24** (1), 169-179.
- Bharati, P. and Chaudhury, A. (2006) Product Customisation on the Web: An Empirical Study of Factors Impacting Choice board User Satisfaction, *Information Resources Management Journal*, **19** (2), 69-81.
- Bikson, T., Stasz, C. and Mankin, D. (1985) *Computer-mediated Work: Individual and Organizational Impact in One Corporate Headquarters*, Santa Monica, CA: Rand.
- Bingi, P., Sharma, M. and Godla, J. (1999) Critical Issues Affecting an ERP Implementation, *Information Systems Management*, **16** (3) 7-14.
- Blanton, J., Watson, H. and Moody, J. (1992) Toward a Better Understanding of Information Technology Organisation: A Comparative Case Study, *MIS Quarterly*, **16** (4), 531-555.

- Blaylock, B. and Rees, L. (1984) Cognitive Style and the Usefulness of Information, *Decision Science*, **15** (1), 74-91.
- Bless, C. and Higson-Smith, C. (1995) *Fundamentals of Social Research Methods: An African Perspective*, Juta: Kenwyn, South Africa.
- Blumenthal, S. (1969) *Management Information Systems: A Framework for Planning and Development*, Englewood Cliffs, NJ: Prentice-Hall.
- Bokhari, R. (2005) The Relationship between System Usage and User satisfaction –A Meta Analysis, *Journal of Enterprise Information Management*, **18** (1/2), 211-224.
- Bollen, K. and Long, J. (1993) Introduction. In: Bollen, K. and Long, J. (eds.), *Testing Structural Equation Models*, Sage, Newbury Park, 1-9.
- Boomsma, A. and Hoogland, J. (2001) The Robustness of LISREL modelling revisited. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Brady, R. (1967) Computers in Top-level Decision Making, *Harvard Business Review*, **45** (4), 67-76.
- Bradley, R., Pridmore, J. and Byrd, T. (2006) Information System Success in the Context of Different Corporate Cultural Types: An Empirical Investigation, *Journal of Management Information Systems*, **23** (2), 267-294.
- Brislin, R. (1986) *The Wording and Translation of Research Instruments*. In Almutiari, H. (2001) *Evaluating Information System Success in Public Organizations: A Theoretical Model and Empirical Validation*, Doctoral Thesis, Pennsylvania State University.
- Broos, A. (2005) Gender and information and communication technologies (IT) anxiety: male self assurance and female hesitation, *Cyber Psychology & Behaviour*, **8** (1), 21-31.

- Brown, I. and Jayakody, R. (2008) B2C E-commerce Success: A Test and Validation of a Revised Conceptual Model, *The Electronic Journal Information Systems Evaluation*, **11** (3), 167-184.
- Brown, T., Churchill, G. and Peter, J. (1993) Improving the Measurement of Service Quality, *Journal of Retailing*, **69** (1), 127-139.
- Bryman, A. (1995) *Quantity and Quality in Social Research*, London, UK: Routledge.
- Bryman, A. (2004) *Social Research Methods*, 2nd Edition, Oxford, Oxford University Press.
- Bryman, A. (1989), *Research Methods and Organization Studies*, Unwin: Hyman, London.
- Brynjolfsson, E. (1993) The Productivity Paradox of Information Technology, *Communications of the ACM*, **35** (12), 66-77.
- Brynjolfsson, E. and Hitt, L. (1998) Beyond the Productivity Paradox: Computers are the Catalyst for Bigger Changes, *Communications of the ACM*, **41** (8), 49-56.
- Brynjolfsson, E. and Yang, S. (1996) Information Technology and Productivity: A Review of the Literature, *Advances in Computers*, **43**, 179-214.
- Byrd, T. and Marshall, T. (1997) Relating Information Technology Investment to Organizational Performance: A Causal Model Analysis, *Omega, International Journal of Management Science*, **25** (1), 43-56
- Carlyle, R. (1988) *CIO: Misfit or Misnomer*, Datamation (August 1), 50-6. In: Loonam, J. and McDonagh, J. (2005) Exploring Top Management Support for the Introduction of Enterprise Information Systems: A Literature Review, *Irish Journal of Management*, **26** (1), 163-178.
- Cates, D., Chong, H. and Rauniar, R. (2009) An Empirical Analysis of DeLone and McLean's E-commerce Model in the Student Industry, *International Journal of Electronic Business*, **7** (1), 86-104.

- Central Bank of Egypt (CBE) 2008. CBE, 2007/2008, **47** (2) *Economic Review, Research, Development and Publishing Sector*, CBE Publications, Egypt.
- Central Bank of Egypt (CBE) 2008. CBE, 2007/2008, *Annual Report, Research, Development and Publishing Sector*, CBE Publications, Egypt.
- Cerullo, M. (1980) Information System Success Factors, *Journal of Systems Management*, **31** (12), 10-19.
- Chan, Y. (2000) IT Value: The Great Divide between Qualitative and Quantitative and Individual and Organizational Measures, *Journal of Management Information Systems*, **16** (4), 225-261.
- Cheney, P. and Dickson, G. (1990) Organizational Characteristics and Information Systems: An Exploratory Investigation, *Academy of Management Journal*, **25** (1), 170-184.
- Chin, W. (1998) Issues and Opinion on Structural Equation Modelling, *MIS Quarterly*, **22** (1), vii-xvi.
- Chin, W. and Marcolin, B. (2001) *The Future of Diffusion Research, The Data Base for Advances in Information Systems*, **32** (3), 8-12.
- Chin, W., Marcolin, B. and Newsted, P. (2003) A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects: Results from a Monte Carlo Simulation Study and an Electronic- mail Emotion/ adoption Study, *Information Systems Research*, **14** (2), 189-217.
- Chin, W. and Newsted, P. (1999) Structural Equation Modeling Analysis with Small Samples Using Partial Least Squares. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Chiu, C., Chiu, C. and Chang, H. (2007) Examining the Integrated Influence of fairness and Quality on Learners' Satisfaction and Web-Based Learning continuance Intention, *Information Systems Journal*, **17** (3), 271-287.

- Choe, J. (1996) The Relationships among Performance of Accounting Information Systems, Influence Factors, and Evolution Level of Information Systems, *Journal of Management Information Systems*, **12** (4), 215–239.
- Chow, T. (1985) Software Quality: Definitions, Measurements and Applications. Tutorial on Software Quality Assurance: A Practical Approach, *Silver Spring, MD: IEEE Computer Society Press*. In: Medina, M. and Chaparro, J. (2008) The Impact of the Human Element in the Information System Quality for Decision Making and User Satisfaction, *The Journal of Computer Information Systems*, **48** (2), 44-52.
- Chow, W. and King, H. (2001) Discriminating Factors of Information Systems Function Performance in Hong Kong Firms Practicing TQM, *International Journal of Operations & Production Management*, **21** (5/6), 749-771.
- Christian, L., Belanger, F. and Fan, W. (2009) Examining the Success of Websites Beyond E- Commerce: An Extension of the IS Success Model, *The Journal of Computer Information Systems*, **49** (4), 42-52.
- Churchill, G. (1979) A Paradigm for Developing Better Measures for Marketing Constructs, *Journal of Marketing Research*, **10**, 64-73.
- Churchill, G. (1999) *Marketing Research: Methodological Foundations*, Dryden Press, Fort Worth, Tex and London.
- Coe, L. (1998) *Five Small Secrets to System Success*. In: Garrity, E.J., and Sanders, G.L. (1998) *Information Systems Success Measurement*, Hershey, USA: Idea Group Publishing.
- Cohen, L. and Manion, L. (1994) *Research Methods in Education*, London, UK: Routledge.
- Collis, J. and Hussey, R. (2003) *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*, 2nd Edition, Palgrave MacMillan.
- Collopy, F. (1996) Biases in Retrospective self-reports on Time Use: An Empirical Study of Computer Users, *Management Science*, **42** (5), 758-767.

- Compeau, D., Higgins, C. and Huff, S. (1999) Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study, *MIS Quarterly*, **23** (2), 145-158.
- Conklin, J., Gotterer, M. and Rickman, R. (1982) On-line Terminal Response Time: The Effects of Background Activity, *Information and Management*, **5** (3), 12-20.
- Cooper, D. and Schindler, P. (2003) *Business Research Methods*, Irwin McGraw-Hill, Boston and London.
- Creswell, J. (1998) *Qualitative Inquiry and Research Design: Choosing Among Five*, Thousand Oaks, CA: *Traditions*, Sage.
- Cron, W. and Sobol, M. (1983) The Relationship between Computerization and Performance: A Strategy of Maximizing the Economic Benefits of Computerization, *Information and Management*, **6** (3), 171-181.
- Cronan, T. and Douglas, D. (1990) End-user Training and Computing Effectiveness In Public Agencies: An Empirical Study, *Journal of Management Systems*, **6** (4), 21-39.
- Cronin, Jr. and Taylor, S. (1992) Measuring Service Quality: A Reexamination and Extension, *Journal of Marketing*, **56** (3), 55-68.
- Cross, J., Earl, M. and Sampler, J. (1997) Transformation of the IT Function at British Petroleum, *MIS Quarterly*, **21** (4), 401-423.
- Culnan, M. (1983) Chauffeured Versus End User Access to Commercial Database: The Effects of Task and Individual Differences, *MIS Quarterly*, **7** (4), 55-67.
- D'Ambra, J. And Rice, R. (2001) Emerging Factors in User Evaluation of the World Wide Web, *Information and Management*, **38** (6), 373-384.
- Dahawy, K. Tooma, E. and Kamel, S. (2005) The Use of IT in Teaching Accounting in Egypt: The Case of Becker Conviser, *Communications of the IIMA*, **5** (3), 25-34.
- Dalcher, D. and Drevin, L. (2003) *Learning from Information Systems Failures by Using Narrative and Ante-narrative Methods*, Proceedings of SAICSIT, 137-142.

- Dansereau, F. Alutto, J. and Yammarino, F. (1984) *Theory Testing in Organizational Behaviour: The Variant Approach*, Englewood Cliffs, NJ: Prentice-Hall.
- Davenport, T. (1998) Putting the Enterprise into the Enterprise System, *Harvard Business Review*, **76** (4), 121-131.
- Davis, S. (1989) Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology, *MIS Quarterly*, **13** (3), 319-340.
- Davis, F., Bagozzi, R. and Warshaw, P. (1989) User Acceptance of Computer Technology: A Comparison of Two Theoretical Models, *Management*, **35** (2), 982-1003.
- Deans, P., Karwan, K., Goslar, M., Ricks, D. and Toyne, B. (1991) Identification of Key International Information Systems Issues in US-Based Multinational Corporations, *Journal of Management Information Systems*, **7**, 27-50.
- Deans, P. and Ricks, D. (1991) MIS Research: A Model for Incorporating International Dimensions, *The Journal of High Technology Management Research*, **2**, 57-81.
- DeLone, W. and McLean, E. (1992) Information Systems Success: The Quest for the Dependent Variable, *Information Systems Research*, **3** (1), 60-95.
- DeLone, W. and McLean, E. (2003) The Delone and McLean Model of Information Systems Success: A Ten- Year Update, *Journal of Management Information Systems*, **19**(4), 9-30.
- DeLone, W. and McLean, E. (2004) Measuring E-commerce Success: Applying the DeLone and McLean Information Systems Success Model, *International Journal of Electronic Commerce*, **9** (1), 31-47.
- Diebold, J. (1969) Bad Decisions on Computer Use, *Harvard Business Review*, **47** (1), 14-16, 27-28, 176.
- Dickson, G., Senn, J. and Chervany, N. (1977) Research in Management Information Systems: The Minnesota Experiments, *Management Science*, **23** (9), 913-923.

- Dickson, G., and Simmons, J. (1970) The Behavioral Side of MIS: Some Aspects of the People Problem, *Business Horizons*, **13** (8), 59-71.
- Doll, W. (1985) Avenues for Top Management Involvement in Successful MIS Development, *MIS Quarterly*, **9** (1), 17-35.
- Doll, W. and Torkzadeh, G. (1988a) Developing a Multi Dimensional Measure of System-use in an Organizational Context, *Information and Management*, **33**, (4), 171-185.
- Doll, W. and Torkzadeh, G. (1988b) The Measurement of End-user Computing Satisfaction, *MIS Quarterly*, **12** (2), 258-274.
- Doll, W. and Torkzadeh, G. (1998) Developing a Multidimensional Measure of System Use in an Organizational Context, *Information and Management*, **33** (4), 171-185.
- Doll, W., Xia, W. and Torkzadeh, G. (1994) A Confirmatory Factor Analysis of End-User Computing Satisfaction Instrument, *MIS Quarterly*, **18** (4), 453-461.
- Drucker, P. (1989) *The New Realities*, Harper & Row: New York.
- Eason, K. (1976) Understanding the Naive Computer User, *Computer Journal*, **19** (1), 3- 7.
- Egypt Information Technology Report (2009) Business Monitor International Ltd.
- Ein-Dor, P. and Segev, E. (1978) Strategic Planning for Management Information Systems, *Management Science*, **24** (15), 1631-1641.
- Ein-Dor, P., Segev, E. and Steinfeld, A. (1981) *Use of Management Information Systems: An Empirical Study*, Proceedings of the Second International Conference on Information Systems, Cambridge, MA, 215-228.
- Ein-Dor, P. and Segev, E. (1987) Organizational Context and the Success of Management Information Systems, *Management Sciences*, **24** (10), 1064-1077.

- Ein-Dor, P., Segev, E. and Orgad, M. (1993) The Effect of National Culture on IS: Implications for International Information Systems, *Journal of Global Information Management*, **1**, 33-44.
- Eisenhardt, K. and Bourgeois, L. (1988) Politics of Strategic Decision Making in High Velocity Environments: Towards a Mid-range Theory, *Academy of Management Journal*, **31** (4), 737-770.
- Elnady, O. (1996) Innovative Work Environments: the Role of Information Technology and Systems, *SAM Advanced Management Journal*, **61** (3), 125-137.
- Elnady, O. and Elkordy, M. (1997) The Relation of Some Personal and Situational Factors to IS Effectiveness: Empirical Evidence from Egypt, *Journal of Global Information Management*, **5** (2), 22-33.
- Elnady, O. and Elkordy, M. (1999) The Relationship between User Satisfaction and System Usage: Empirical Evidence from Egypt, *Journal of End-User Computing*, **11** (2), 21-28.
- Elnady, O. and Elkordy, M. (2005) EIS Information: Use and Quality Determinates, *Information Resources Management Journal*, **18** (2), 68-93.
- E-marketer, 2007 [Online], Available from <http://www.emarketer.com> [Accessed 12/2/2007].
- Estevez, J. and Pastor, J. (2000) *Towards the Unification of Critical Success Factors for ERP Implementations*, 10th Annual UIT Conference, Manchester, UK.
- Evans, M., Abela, A. and Beltz, T. (2002) Seven Characteristics of Dysfunctional software projects, *Crosstalk: Journal of Defense Software Engineering*, Apr.
- Ewusi-Mensah, K. and Przasnyski, Z. (1991) On Information System Project Abandonment: An Exploratory Study of Organisational Practices, *MIS Quarterly*, **15** (1), 67-85.
- Ewusi-Mensah, K. and Przasnyski, Z. (1994) Factors Contributing to The Abandonment of Information Systems Development Projects, *Journal of Information Technology*, **9** (3), 185-201.

- Fornell, C. and Larcker, D. (1981) Evaluating Structural Equation Models with Unobservable Variables and Measurement Error, *Journal of Marketing Research*, **18** (1), 39-50.
- Foshay, N. (2008) *Wining the Hearts and Minds of Data Warehouse Users: The Role of End-user Meta-data*, Doctoral Thesis, University of Bradford.
- Foster, D. and Cornford, T. (1992) *Evaluation of Health Information Systems: Issues, Models and Case Studies, Social Implications of Computers in Developing Countries*, McGraw-Hill.
- Fowler, J. and Horan, P. (2007) Are Information System's Success and Failure Factors Related? An Exploratory Study, *Journal of Organisational and End User Computing*, **19** (2), 1-22.
- Franz, C. and Robey, D. (1986) Organizational Context, User Involvement, and the Usefulness of Information Systems, *Decision Sciences*, **17** (3), 329-355.
- Gallagher, C. (1974) Perceptions of the Value of Management Information Systems, *Academy of Management Journal*, **17** (1), 46-55.
- Galliers, R. (1992) Information Technology: Management's Boon or Bane? , *Journal of Strategic Information Systems*, **1** (2), 30-6.
- Gandy, A. (1998) How the Internet will Shape Global Banking, *Chartered Banker*, **4** (4), 32-3.
- Garrity, E. (1994) User Participation, Management Support and System Types, *Information Resources Management Journal*, **7** (3), 34-43.
- Garrity, E. and Sanders, G. (1995) *Issues and Instruments for Measuring System Success*, Working paper, School of Management, State University of New York at Buffalo.
- Garrity, E. and Sanders, G. (1998) *Information Systems Success Measurement*, Hershey, USA: Idea Group Publishing.

- Garrity, E. Glassberg, B., Kim, Y, J. Sanders, L. and Shin, S. (2002) An Experimental Investigation of Electronic Commerce Success Factors for Web-based Information Systems, *Journal of Management Information Systems*. In: Kim,Y. (2002) Doctoral thesis, State University of New York.
- Gasser, L. (1986) The Integration of Computing and Routine Work, *ACM Transactions and Office Information Systems*, **4** (3), 205-225.
- Gatian, A. (1994) Is User Satisfaction a Valid Measure of System Effectiveness?, *Information and Management*, **26** (3), 119-131.
- Gefen, D. (2000) It is not Enough to be Responsive: The Role of Cooperative Intentions in MRP II Adoption, *The Data Base for Advances in Information Systems*, **31** (2), 65-79.
- Gefen, D. and Straub, D. (1997) Gender Differences in the Perception and Use of E-mail: An Extension to Technology Acceptance Model, *MIS Quarterly*, **21** (4), 389-400.
- Gefen, D., Straub, D. and Boudreau, M. (2000) Structural Equation Modeling and Regression: Guidelines for research practice, *Communications of the Associations for Information Systems*, **4** (7), 1-78.
- Gelderman, M. (1998) The Relation between User Satisfaction, Usage of Information and Performance, *Information and Management*, **34** (1), 11-18.
- Gelderman, M. (2002) Task Difficulty, Task variability and satisfaction with Management Support Systems, *Information and Management*, **39** (7), 593-604.
- Gentle, C. (1993) *The Financial Services Industry*, Avebury, Hants.
- Ginzberg, M. (1981) Early Diagnosis of MIS Implementation Failure: Promising Results and Unanswered Questions, *Management Sciences*, **27** (4), 459-478.
- Ginzberg, M. (1981) Key Recurrent Issues in the MIS Implementation Process, *MIS Quarterly*, **3** (2), 47-59.
- Glorfeld, K. (1994) *Information Technology: Measures of Success and Impact*, Doctoral Thesis, University of Arkansas, Little Rock, AR.

- Goodhue, D. and Thompson, R. (1995) Task-Technology Fit and Individual Performance, *MIS Quarterly*, **19** (2), 213-233.
- Goodman, S. and Green, J. (1992) Computing in the Middle East, *Communications of the ACM*, **35**(8), 21-25.
- Grover, V., Jeong, S. and Segars, A. (1996) Information Systems Effectiveness: The Construct Space and Patterns of Application, *Information and Management*, **31** (4), 177-191.
- Guiliano, V. (1982) The Mechanization of Office Work, *Scientific American*.
- Guimaraes, T. and Igbaria, M. (1997) Client/Server System Success: Exploring the Human Side, *Decision Sciences*, **28** (4), 851-875.
- Guimaraes, T., Yoon, Y. and Clevenson, A. (1996) Factors Important to Expert System Success: A Field Test, *Information and Management*, **30** (3), 119-130.
- Guimaraes, T., Staples, D. and McKeen, J. (2003) Empirically Testing Some Main User-related Factors for Systems Development Quality, *Quality Management Journal*, **10**(4) 39-54.
- Guimaraes, T., Staples, D. and McKeen, J. (2007) Assessing the Impact from Information Systems Quality, *The Quality Management Journal*, **14** (1), 30-44.
- Guimaraes, T., Armstrong, C. and Jones, B. (2009) A New Approach to Measuring Information System Quality, *The Quality Management Journal*, **16** (1), 42-54.
- Gupta, U. and Collins, W. (1997) The Impact of Information Systems on the Efficiency of Banks: An Empirical Investigation, *Industrial Management and Data Systems*, **97** (1), 10-16.
- Hagel, J. III, Hewlin, T. and Hutchings, T. (1997) Retail Banking: Caught in a Web, *The McKinsey Quarterly*, (2), 42-55.
- Hair, J., Anderson, Jr., Tatham, R. and Black, W. (1992) *Multivariate Data Analysis*, 4th Edition, Englewood Cliffs, NJ: Prentice Hall.

- Hair, J., Anderson, Jr., Tatham, R. and Black, W. (1998) *Multivariate Data Analysis*, 5th Edition, Englewood Cliffs, NJ: Prentice Hall.
- Hakkinen, L. and Hilmola, O. (2008) Life after ERP Implementation: Long-term Development of User Perceptions of System Success in an After-sale Environment, *Journal of Enterprise Information Management*, **21** (3), 285-309.
- Halawi, L., McCarthy, R. and Aronson, J. (2007) An Empirical Investigation of Knowledge Management System's Success, *The Journal of Computer Information Systems*, **28** (2), 121-135.
- Hall, D. and Mansfield, R. (1975) Relationships of age and seniority with career variables of engineers and scientists, *Journal of Applied Psychology*, **60**, 201-210.
- Hamill, J., Deckro, R. and Kloeber, J. (2005) Evaluating Information Assurance Strategies, *Decision Support Systems*, **39** (3), 463-484.
- Hamilton, D. (1999) Linking Strategic Information Systems Concepts to Practice: Systems Integration at the Portfolio Level, *Journal of Information Technology*, **14** (1), 69-83.
- Hamilton, S. and Chervany, N. (1981) Evaluating Information System Effectiveness: Part1, Comparing Evaluation Approaches, *MIS Quarterly*, **5** (3), 55-69.
- Harrison, A. and Rainer, R. (1992). The Influence of Individual Differences on Skill in End-user Computing, *Journal of Management Information Systems*, **9** (11), 93-111.
- Hassan, S. (1994) Environmental Constraints in Utilizing Information Technologies in Pakistan, *Journal of Global Information Management*, **2** (4), 30-39.
- Heeks, R. (2005) Health information systems: Failure, success and improvisation, *International Journal of Medical Informatics*, **75**, 125 - 137.
- Hempel, P. and Kwong, Y. (2001) B2B E-commerce in Emerging Economies: I-metal.com's Non-ferrous Metals Exchange in China, *Journal of Strategic Information Systems*, **10**, 335- 355.

- Hendrickson, A., Glorfeld, K. and Cronan, T. (1994) On the Repeated Test-retest Reliability of the End-user Computing Satisfaction Instrument: A Comment, *Decision Sciences*, **25** (4), 655-667.
- Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Hill, C., Loch, K., Straub, D. and El-Sheshai, K. (1998) A Qualitative Assessment of Arab Culture and Information Technology Transfer, *Journal of Global Information Management*, **6:3** (Summer), 29-38.
- Hirschheim, R. and Smithson, S. (1998) Analyzing Information Systems Evaluation: Another Look at an old Problem, *European Journal of Information Systems*, **7** (3), 158-165.
- Hochstein, A., Zarnekow, R. and Brenner, W. (2004) *Managing IT Service Quality As Perceived by the Customer*, Proceedings of the ITS 15th Biennial Conference, Berlin.
- Holland, C. and Light, B. (1999) A Critical Success Factors Model for ERP Implementation, *IEEE Software*, May/June, 30-36.
- Hong, W., Thong, J. Wong, W. and Tam K. (2001/2002) Determinants of User Acceptance of Digital Libraries: An Empirical Examination of Individual Differences and System Characteristics, *Journal of Management Information Systems*, **18** (3), 97-124.
- Hoos, I. (1960) When Computers Take Over the Office, *Harvard Business Review*, **38** (4), 102-112.
- Houtz, L. and Gupta, U. (2001) Nebraska high school students' computer skills and attitudes, *Journal of Research on Computing in Education*, **33** (3), 316-326.
- Hoyle, R. (1995) *Structural Equation Modelling: Concepts, Issues, and Applications*, Thousand Oaks, Calif and London: Sage.
- Hsieh, J. and Wang, W. (2007) Exploring Employees' Extended Use of Complex Information Systems, *European Journal of Information Systems*, **16** (3), 216-227.

- Hsu, L., Lai, R. and Weng, Y. (2008) Understanding the Critical Factors Effect User Satisfaction and Impact of ERP through Innovation of Diffusion Theory, *International Journal of Technology Management*, **43** (1/3), 30-47.
- Hull, M., Taylor, P., Hanna, J. and Millar, R. (2002) Software Development Process-An Assessment, *Information and Software Technology*, **44** (1), 1-12.
- Hulland, J. (1999) Use of Partial Least Squares (PLS) in Strategic Management Research: A Review of Four Recent Studies, *Strategic Management Journal*, **20** (4), 195-204.
- Hussain, Z. and Flynn, D. (2004), *Seeking Legitimation for an Information System: A Preliminary Activity Model*, European Conference in Information Systems, International Conference, Turku. [Online], Available from <http://portal.acm.org/citation.cfm> [Accessed 27/6/2007].
- Hussein, R. Abdul Karim, N. and Selamat, M. (2007) The Impact of Technological Factors on Information Systems Success in the Electronic-Government Context, *Business Process Management Journal*, **13** (5), 613-627.
- Hussein, S. (2001) *An Analysis of the Factors Affecting the Usage Patterns of Credit Cards and their effect on marketing strategies*, Master Dissertation, School of Commerce, Alexandria University, Egypt (In Arabic).
- Hwang, M. and Thorn, R. (1999) The Effect of User Engagement on System Success: A Meta-analytical Integration of Research Findings, *Information and Management*, **35** (4), 229-236.
- Hwang, M. and Xu, H. (2008) A Structural Model of Data Warehousing Success, *The Journal of Computer Information Systems*, **49** (1), 1-16.
- Ibrahim, R. (1985) Computer Usage in Developing Countries: Case Study Kuwait, *Information & Management*, **8**, 103-112.
- Igbaria, M. (1992) An Examination of Microcomputer Usage in Taiwan, *Information and Management*, **22** (1), 19-28.

- Igbaria, M. (1993) User Acceptance of Microcomputer Technology: An Empirical Test, *OMEGA International Journal of Management Science*, **21** (1), 73-90.
- Igbaria, M., Anandaeajan, M. and AnaKwe, U. (2002) IT Acceptance in a Less-Developed Country: A Motivational Factor Perspective, *International Journal of Information Management*, **22** (1), 1-18.
- Igbaria, M., Guimaraes, T. and Davis, G. (1995) Testing the Determinants of Microcomputer Usage via a Structural Equation Model, *Journal of Management Information Systems*, **11** (4), 87-114.
- Igbaria, M., Pavri, F. and Huff .S. (1989) Microcomputer Applications: An Empirical Look at Usage, *Information and Management*, **16** (4), 187-196.
- Igbaria, M. and Tan, M. (1997) The Consequences of the Information Technology Acceptance on Subsequent Individual Performance, *Information and Management*, **32** (3), 113-121.
- Igbaria, M., Zinatelli, N., Cragg, P. and Cavaye, A. (1997) Personal Computing Acceptance Factors in Small Firms: A Structural Equation Models, *MIS Quarterly*, **21** (3), 279-305.
- Iivari, J. (1987) User Information Satisfaction (UIS) Reconsidered: An Information System as the Antecedent of UIS. In DeGross, J.I. and Kriebel, C.H. (eds.), *Proceedings of the Eighth International Conference on Information Systems*, Pittsburgh PA, 57-73.
- Iivari, J. (2005) An Empirical Test of the DeLone-McLean Model of Information System Success, *Database for Advances in Information Systems*, **36** (2), 8- 27.
- Iivari, J. and Ervasti, I. (1994) User Information Satisfaction: IS Implementability and Effectiveness, *Information and Management*, **27** (4), 205-220.
- Ishman, M. (1998) Measuring Information Success at the Individual level in Cross-Cultural Environment, 60-78. In: Garrity, E.J. and Sanders, G.L. (eds.), *Information System Success Measurement*, Hershey, PA: Idea Group Public.

- Ives, B., Margrethe, M. and Baroudi, J. (1983) The Measurement of User Information Satisfaction, *Communication of the ACM*, **26** (10), 785-793.
- Ives, B. and Olson, X. (1981) Manager or Technician? The Nature of IS Manager's Job, *MJI Quarterly*, **5** (4), 49-103.
- Ives, B. and Olson, M. (1984) User Involvement and MIS Success: Review of Research, *Management Science*, **30** (5), 586-603.
- Jackson, C., Chow, S. and Leitch, R. (1997) Toward an Understanding in the Behavioural Intention to use an Information System, *Decision Science*, **28** (2), 357-389.
- Jarvenpaa, S. and Ives, B. (1991) Executive Involvement and Participation in the Management of Information Technology, *MIS Quarterly*, **15** (2), 205-227.
- Jennex, M., Olfman, L., Panthawi, P. and Park, Y. (1998) *An Organizational Memory Information Systems Success Model: An Extension of DeLone and McLean's Success Model*, Thirty-First Annual Hawaii International Conference on System Sciences, **1**, 157-164.
- Jensen, J. and Markland, R. (1996) Improving the Application of Quality Conformance Tools in Service Firms, *Journal of Services Marketing*, **10** (1), 35-55.
- Jenster, P. (1987) Firm Performance and Monitoring of Critical Success Factors in Different Strategic Contexts, *Journal of MIS*, **3** (3), 17-33.
- Jiang, J. and Klein, G. (1999) User Evaluation of Information Systems: By System Typology, *IEEE Transactions on Systems, Man and Cybernetics*, **29** (1), 111-116.
- Jiang, J. J., Klein, G., Balloun, J. L. and Crampton, S. M. (1999) Systems Analysts' Orientations and Perceptions of System Failure, *Information and Software Technology*, **41**(2), 101-106.
- Jiang, J., Klein, G., Roan, J. and Lin, J. (2001) IS Service Performance: Self-Perceptions and User Perceptions, *Information and Management*, **38** (3), 499-506.

- Jiang, J., Klein, G. and Carr, C. (2002) Measuring Information System Service Quality: SERVQUAL from the Other Side, *MIS Quarterly*, **26** (2), 145-167.
- Johns, J. and McLeod, R. (1986) The Structure of Executive Information Systems: An Exploratory Analysis, *Decision Sciences*, **17** (2), 220-249.
- Johnston, H. and Vitale, M. (1988) Creating Competitive Advantage with Inter-Organizational Information Systems, *MIS Quarterly*, **12** (2), 153-165.
- Joshi, K. (1990) An Investigation of Equity as a Determinate of User Information Satisfaction, *Decision Sciences*, **21** (4), 786-807.
- Jun, M., Yang, Z. and Kim, D. (2004) Customers' Perceptions of On- line Retailing Service Quality and their Satisfaction, *International Journal of Quality and Reliability Management*, **21** (8), 817-840.
- Kaiser, K. and Srinivasan, A. (1980) *The Relationship of User Attitudes toward Design Criteria and Information System Success*, Proceedings of the Twelfth Annual Meeting of American Institute of Decision Science, Las Vegas, NV.
- Kamel, S. (1995) IT Diffusion and Socio Economic Change in Egypt, *Journal of Global Information Management*, **3**(2), 4-17.
- Kamel, S. and Assem, A. (2002) *Using TAM to Assess the Potentials of Electronic Banking in Egypt*, IS One Conference Proceedings, Las Vegas, NV, USA, 3-5 April.
- Kamel, S. and Hassan, A. (2003) Assessing the Introduction of Electronic Banking in Egypt using the Technology Acceptance Model, *Annals of Cases on Information Technology*, **5**, 1-25.
- Kanaracus, C. (2008) Gartner: Global IT Spending Growth Stable, *InfoWorld*, April 3.
- Kanellis, P., Lycett, M. and Paul, R. (1999) Evaluating Business Information Systems Fit: From Concept to Practical Application, *European Journal of Information Systems*, **18** (1), 65-76.

- Kanter, J. (1986) The Role of Senior Management in MIS, *Journal of Systems Management*, **37** (4), 10-17.
- Kapelman, L. and Mclean, E. (1991) *The Respective Roles of User Participation and User Involvement in Information System Implementation Success*. Proceedings of the Twelfth International Conference on Information Systems, New York, NY, 339-349.
- Karahanna, E. and Straub, D. (1999) An Exploratory Contingency Model of User Participation and MIS Use, *Information and Management*, **35** (4), 237-250.
- Karimi, J. and Konsynski, B. (1991) Globalization and Information Management, *Journal of Management Information Systems*, **7**, 7-26.
- Karr, J. (1996) Technology Spending and Alliances: New Highs in Financial Service Firm, *Journal of Retail Banking Services*, **18** (3), 45-8.
- Kedia, B. and Bhagat, R. (1991) Cultural Constraints on Transfer of Technology across Nations: Implications for Research in International and Comparative, *Academy of Management Review*, **13** (4), 559-71.
- Keen, P. (1981) Value Analysis: Justifying Decision Support Systems, *MIS Quarterly*, **5** (1), 1-16.
- Keil, M., Wallace, L., Turk, D., Dixon-Randall, G. and Nulden, U. (2000) An Investigation of Risk Perception and Risk Propensity on The Decision to Continue A Software Development Project, *The Journal of Systems and Software*, **53** (2), 145-157.
- Kelloway, E. (1998) *Using LISERAL for Structural Equation Modelling: A Research's Guide*, Thousand Oaks, London: Sage.
- Kendall, K. and Kendall, J. (1992) *Systems Analysis and Design*. 2nd Edition. Englewood Cliffs, N.J., London: Prentice-Hall International.
- Kerlinger, F. (1986) *Foundations of Behavioural Research*, 3rd Edition, New York, NY: Holt Rinehart and Winston.

- Kettinger, W. and Lee, C. (1995) Perceived Service Quality and User Satisfaction with the Information Service Function, *Decision Sciences*, **25** (5- 6), 737-765.
- Kidder, L. and Judd, C. (1986) *Research Methods in Social Relations*, 5th Edition. New York, NY: Holt, Rinehart and Wilson.
- Kim, C., Suh, K. and Lee, J. (1998) Utilization and User Satisfaction in End-user Computing: A Task Contingent Model, *Information Resources Management Journal*, **11** (4), 11-24.
- Kim, E. and Lee, J. (1986) An Exploratory Contingency Model of User Participation and MIS Use, *Information and Management*, **11** (2), 87-97.
- King, W. and Rodriguez, J. (1978) Evaluating Management Information Systems, *MIS Quarterly*, **2** (3), 43-51.
- King, W. and Rodriguez, J. (1981) Participative Design of Strategic Design Support Systems: An Empirical Assessment, *Management Science*, **27** (6), 717-726.
- Khalfan, A. and Alshawaf, A. (2004) Adoption and Implementation Problems of E-banking: A Study of the Managerial Perspectives of the Banking Industry in Oman, *Journal of Global Information Technology Management*, **7** (1), 47-64.
- Kline, P. (2000) *The Handbook of Psychological Testing*, 2nd Edition, London and New York: Routledge.
- Kositanurit, B., Ngwenyama, O. and Osei-Bryson, K. (2006) An Exploration of Factors that Impact Individual Performance in an ERP Environment: An Analysis Using Multiple Analytical Techniques, *European Journal of Information Systems*, **15** (6), 556-568.
- Kraemer, K., Danzinger, J., Dunkle, D. and King, J. (1993) The Usefulness of Computer-based Information to Public Managers, *MIS Quarterly*, **17** (2), 129-148.
- Kriebel, C. (1979) Evaluating the Quality of Information Systems. In Szyperski, J. and Grochla, M. (eds.), *Design and Implementation of Computer-based Information Systems*, Germantown: Silthoff and Noordhoff, 29-43.

- Kriebel, C. and Raviv, A. (1982) Application of a Productivity Model for Computer Systems, *Decision Sciences*, **13** (2), 266-284.
- Kulkarni, U., Ravindran, S. and Freeze, R. (2006) A knowledge Management Success Model: Theoretical Development and Empirical Validation, *Journal of Management Information Systems*, **23** (3), 309-347.
- Lai, J. and Yang, C. (2009) Effects of Employees' Perceived Dependability on Success of Enterprise Applications in E-business, *Industrial Marketing Management*, **38**, 163-274.
- Larcker, D., and Lessig, V. (1980) Perceived Usefulness of Information: A Psychometric Examination, *Decision Science*, **11** (1), 266-284.
- Law, C. and Ngai, E. (2007) ERP Systems Adoption: An Exploratory Study of the Organisational Factors and Impacts of ERP Success, *Information and Management*, **44** (4), 418-432.
- Lawrence, M. and Low, G. (1993) Exploring Individual User Satisfaction Within User-led Development, *MIS Quarterly*, **17** (2), 195-208.
- Leaderer, A. and Mendelow, A. (1986) Issues in Information Systems Planning, *Information and Management*, **10** (5), 245-254.
- Leaderer, A. and Mendelow, A. (1987) Information Resource Planning: Overcoming Difficulties in Identifying Top Management's Objectives, *MIS Quarterly*, **11** (3), 389-99.
- Leaderer, A. and Mendelow, A. (1988) Convincing Top Management of the Strategic Potential of Information Systems, *MIS Quarterly*, **12** (4), 525- 534.
- Lee, D. (1986) Usage Patterns and Sources of Assistance to Personal Computer Users, *MIS Quarterly*, **10** (4), 313-325.
- Lee, K., Kirlidog, M., Lee, S. and Lim, G. (2008) User Evaluation of Tax Filing Web Sites: A Comparative Study of South Korea and Turkey, *Online Information Review*, **32** (6), 842-859.

- Lee, K. and Chung, N. (2009) Understanding Factors affecting Trust in and Satisfaction with Mobile Banking in Korea: A Modified DeLone and McLean's Model Perspective, *Interact. Comput.* doi: 10.1016/j.intcom.2009.06.004.
- Lee, S., Gu, J. and Suh, Y. (2009) Determinants of Behavioural Intention to Mobile Banking, [Online], Available at www.elsevier.com/locate/eswa [Accessed 1/7/2009].
- Leidner, D. and Jarvenpaa, S. (1993) The Information Age Confronts Education: Case Studies of Electronic classrooms, *Information Systems Research*, **4** (1), 24-54.
- Leitheiser, R. and Wetherbe, J. (1986) Service Support Levels: An Organized Approach to End-user Computing, *MIS Quarterly*, **10** (4), 337-349.
- Leonard, L. And Riemenschneider, C. (2008) What Factors Influence the Individual Impact of the Web? An Initial Model, *Electronic Markets*, **18** (1), 75-90.
- Levy, Y. And Danet, T. (2007) Towards an Implementation Success Model of a Centralised Identification System at a NASA Centre, [Online], Available from www.nasa.gov//audience [Accessed 15/7/2008].
- Li, E. (1997) Perceived Importance of Information System Success Factors: A Meta Analysis of Group Differences, *Information and Management*, **32** (1), 5- 28.
- Liaw, S. (2002) An Internet survey for perceptions of computers and the World Wide Web: relationship, prediction, and difference, *Computers in Human Behaviour*, **18** (1), 17-35.
- Llewellyn, D. (1996) *Banking in the 21st Century: The transformation of an Industry*, Research paper, South borough University Banking Centre.
- Lin, H. (2007) Measuring On-line Learning Systems Success: Applying the Updated DeLone and McLean Model, *Cyber Psychology and Behavior*, **10** (6), 817-820.
- Lin, H. (2008) Determinants of Successful Virtual Communities: Contributions from System Characteristics and Social Factors, *Information and Management*, **45** (8), 522-527.

- Liu, C. and Arnett, K. (2000) Exploring the Factors Associated with Web site Success in the Context of Electronic Commerce, *Information and Management*, **38** (1), 23-33.
- Liu, H. and Wang, J. (1997) The Relationship between Management Styles, User Participation and System Success over MIS Growth Stages, *Information and Management*, **32** (3), 203-213.
- Liu, L. and Louvieris, P. (2006) Managing Customer Retention in the UK Online Banking Sector, *International Journal of Information Technology and Management*, **5** (4), 295-307.
- Lohmoller, J. (1989) *Latent Variable Path Modeling with Partial Least Squares*. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Loonam, J. and McDonagh, J. (2005) Exploring Top Management Support for the Introduction of Enterprise Information Systems: A Literature Review, *Irish Journal of Management*, **26** (1), 163-178.
- Lu, J., Yu, C., Liu, C. (2006) *Gender and Age Differences in Individual Decisions about Wireless Mobile Data Services: A Report from China*, Proceedings of Hong Kong Mobility Roundtable 2006, Hong Kong, China.
- Lucas, H. (1975a) The Use of an Accounting Information System: Action and Organizational Performance, *the Accounting Review*, **4**, 735-746.
- Lucas, H. (1975b) *Why Information Systems Fail?* New York, NY: Columbia University Press.
- Lucas, H. (1975c) *Behavioral Factors in Systems Implementations*. In Schultz, R. and Slevin, D. *Implementing Operations Research/ Management Science*, American Elsevier, NY.
- Lucas, H. (1978) The Use of an Interactive Information Storage and Retrieval System in Medical Research, *Communications of ACM*, **21** (3), 197-205.

- Lucas, H. (1981a) An Experimental Investigation of the Use of Computer-based Graphics in Decision-making, *Management Science*, **27** (97), 757-768.
- Lucas, H. (1981b) *Management Information Systems*, New York: McGraw-Hill.
- Lucas, H. (1982) *Information Systems Concepts*, New York: McGraw-Hill.
- Lucas, H. (1999) *Information Technology and the Productivity Paradox*, New York Oxford, Oxford University Press.
- Lucas, H. and Spittler, V. (1999) Technology Use and Performance: A Field Study of Broker Workstations, *Decision Science*, **30** (2), 291-311.
- Lyles, M. (1979) Making Operational Long-Range Planning for Information Systems, *MIS Quarterly*, (June), 9-19.
- Lyytinen, K. (1988) Expectation Failure Concept and Systems Analysts' View of Information System Failure: Results of an Exploratory Study, *Information & Management*, **14** (1), 45-56.
- Lyytinen, K. and Hirschheim, R. (1987) Information Systems Failures: A Survey and classification of the Empirical Literature, *Oxford Survey in Information Technology*, **4**, 257-309.
- Magued, M. (2001) *IT in Financial Services*, Working Paper. In: Kamel, S. and Hassan, A. (2003) Assessing the Introduction of Electronic Banking in Egypt using the Technology Acceptance Model, *Annals of Cases on Information Technology*, **5**, 1-25.
- Mahmood, M. and Becker, J. (1985, 1986) Effect of Organizational Maturity on End-users` Satisfaction with Information Systems, *Journal of Information Systems*, **2** (3), 37-46.
- Mahmood, M. and Medewitz, J. (1985) Impact of Design Methods on Decision Support System Success: An Empirical Assessment, *Information and Management*, **9** (3), 137-151.

- Mahmood, M. and Soon, S. (1991) A Comprehensive Model for measuring the Potential Impact of Information Technology on Organizational Strategic Variables, *Decision Science*, **22** (4), 869-897.
- Maish, A. (1979) A User's Behaviour towards his MIS, *MIS Quarterly*, **3** (1), 39-52.
- Malhotra, Y. (2004) *Enterprise Architecture: An Overview*, [Online] Available from <http://www.brint.com/papers/enterarch.htm> [Accessed 26/6/2006].
- Malhotra, Y. and Galletta, D. (2005) Model of Volitional Systems Adoption and Usage Behaviour, *Journal of Management Information Systems*, **22** (1), 117-151.
- Marcolin, B., Munro, M. and Campbell, K. (1997) End-user Ability: Impact of Job and Individual Differences, *Journal of End-user Computing*, **9** (3), 3-12.
- Mark, R. (1996) *Research Made Simple: A Handbook for Social Workers*, Thousand Oaks, Cali and London: Sage.
- Markus L. (1983) Power, Politics, and MIS Implementation, *Communications of the ACM*, **26** (6), 43-57.
- Martinsons, N. and Chong, P. (1999) The Influence of Human Factors and Specialist Involvement on Information Systems Success, *Human Relations*, **52** (1), 123-152.
- Mason, R. (1978) Measuring Information Output: A Communication Systems Approach, *Information and Management*, **1**, 219-237.
- Masrek, M. (2007) Measuring Campus Portal Effectiveness and the Contributing Factors, *Campus-Wide Information Systems*, **24** (5), 342-354.
- Mawhinney, C. and Leaderer, A. (1990) A Study of Personal Computer Utilization by Managers, *Information and Management*, **18** (5), 243-253.
- McFarlane, F. (1984) Information Technology Changes the Way You Compete, *Harvard Business Review*, **62** (3), 98-103.
- McGill, T., Hobbs, V. and Klobas, J. (2003) *User-developed Applications and Information System Success: A Test of Delone and McLean's Model*, *Information Resources Management Journal*, **16** (1), 24-45.

- McGill, T. and Klobas, J. (2005) The Role of Spreadsheets Knowledge in User-Development Application Success: *Decision Support Systems*, **39** (3), 355-369.
- Meador, C., Guyote, M. and Keen, P. (1984) Setting Priorities for DSS Development, *MIS Quarterly*, **8** (2), 117-129.
- Medina, M. and Chaparro, J. (2008) The Impact of the Human Element in the Information System Quality for Decision Making and User Satisfaction, *The Journal of Computer Information Systems*, **48** (2), 44-52.
- Melone, N. (1990) A Theoretical Assessment of the User Satisfaction Construct in Information Systems Research, *Management Science*, **36** (4), 76-91.
- Meng, Z. and Lee, S. (2007) The Value of IT to Firms in a Developing Country in the Catch-up Process: An Empirical Comparison between of China and the United States, *Decision Support Systems*, **43** (3), 737-745.
- Miles, M. and Huberman, A. (1994) *Qualitative Data Analysis: An Expanded Source Book*, 2nd Edition, Thousand Oaks, CA: Sage.
- Millman, Z. and Hartwick, J. (1987) The Impact of Automated Office Systems on Middle Managers and Their Work, *MIS Quarterly*, **11** (4), 479-490.
- Mitev, N. (2000) *Toward Social Constructivist Understanding of IS Success and Failure: Introducing A New Computerized Reservation System*, Proceeding of The 21st International Conference on Information Systems, Brisbane, Australia, 84-93.
- Molla, A. and Licker, P. (2001) E-commerce Systems Success: An Attempt to Extend and Respecify the DeLone and McLean Model of IS Success, *Journal of Electronic Commerce Research*, **2** (4), 131-141.
- Mols, N. (1998) The Behavioural Consequences of PC Banking, *International Journal of Bank Marketing*, **16**(5), 195-201.
- Montazemi, A. (1988) Factors Affecting Information Satisfaction in the Context of the Small Business Environment, *MIS Quarterly*, **12** (2), 239-265.

Monthly Statistical Bulletin, research, development and publishing sector, 129, 2007.
[Online], Available from http://www.aph.gov.au/library/rsspubs_feed.xml
[Accessed 25/6/2006].

Morone, J. and Berg, D. (1993) Management Technology in the Service Sector: Practices in the Banking Industry, *The Journal of High Technology Management Research*, **4** (1), 123-137.

Morris, M. and Venkatesh, V. (2000) Age differences in technology adoption decisions: Implications for a changing work force, *Personnel Psychology*, **53**(2), 375-403.

Morris, M., Venkatesh, V. and Ackerman, P. (2005). Gender and age differences in employee decisions about new technology: an extension to the theory of planned behaviour, *IEEE Transactions on Engineering Management*, **52**(1), 69-84.

Morvaridi, B. (2005), *Data Collection Skills and Techniques*, 2005/2006 Graduate School Module 2 Study Guide, University of Bradford, UK.

Movizzo, J. and Howe, R. (1995) The Team at the Top, *CIO*, **9** (2), 26-8.

Munshi, J. (1996) *Framework of MIS Effectiveness*, Proceedings, Academy of Business Administration, 1996 International Conference, Athens, Greece, 26-32.

Myers, B., Kappelman, L. and Prybutok, V. (1997) A Comprehensive Model for Assessing the Quality and Productivity of the Information System Function: Towards a Theory of Information System Assessment, *Information Resources Management Journal*, **10** (1), 6-25.

Nachmias, C. and Nachmias, D. (2000) *Research in Methods in the Social Sciences*, 6th Edition, New York: Worth Publishers.

Nellis, J. (1998) Strategies for Staying Ahead, *Chartered Banker*, June, 28-31.

Nelson, D. (1990) Individual Adjustment to Information- driven Technologies: A Critical Review, *MIS Quarterly*, **14** (1), 79-98.

Nelson, R. and Cheney, P. (1987) Training End-users: An Exploratory Study, *MIS Quarterly*, **11** (4), 547-559.

- Neuman, W. (2000) *Social Research Methods*, Needham Heights, MA: Allyn & Bacon.
- Neuman, W. (2004) *Basics of Social Research: Qualitative and Quantitative Approaches*, Pearson Education, Inc.USA.
- Newman, M. and Robey, D. (1992) A Social Process Model User-analyst Relationships, *MIS Quarterly*, **16** (2), 249-266.
- Nickell, G. and Pinto, J. (1986) The Computer Attitude Scale, *Computer in Human Behaviour*, **2**, 301-306.
- Nolan, R. and McFarlan, F. (2005). Information Technology and the Board of Directors, *Harvard Business Review*, **83**(10), 96.
- Norusis, M. (2000) *SPSS 10.0 Guide to Data Analysis*, Upper Saddle River, N.J: Prentice Hall.
- Noshei, A. (1984) *An Empirical Investigation of Systems Analysis and Design in Some Egyptian Corporations*, Doctoral dissertation, Faculty of Commerce, Mansoura University, Egypt (in Arabic).
- Nunnally, J. (1978) *Psychometric Theory*, 2nd Edition, New York: NY: McGraw-Hill.
- O'Brian, J. (1996) *Management Information Systems: Managing Information Technology in the Networked Enterprise*, 3rd Edition, Times Mirror, Higher Education Group.
- Odedra, M., Lawrie, M., Bennett, M. and Goodman, S. (1993) Sub-Saharan Africa: A Technological Desert, *Communications of the ACM*, **35** (2), 25-9.
- O'Reilly, C. (1982) *Variations in Decision Makers Use of Information Sources: The Impact of Quality and Accessibility of Information*, *Academy of Management Journal*, **24** (4), 756-771.
- Orlikowski, W. and Baroudi, J. (1991) Studying Information Technology in Organisations: Research Approaches and Assumptions, *Information Systems Research*, **2** (1), 376-394.

- Orlikowski, W. and Robey, D. (1991) Information Technology and the Structuring of Organisations, *Information System Research*, **2**(2), 143-169.
- Palmer, J. (2002) Web Site Usability, Design and Performance Metrics, *Information Systems Research*, **13** (1), 151-167.
- Palvia, P. and Palvia, S. (1999) An Examination of the IT Satisfaction of Small-Business Users, *Information and Management*, **33** (3), 127-137.
- Palvia, S. and Saraswat, S. (1992) *Information Technology and the Transnational Corporation: The Merging Multinational Issues*, Harrisburg, PA: Idea Group Publishing.
- Palvia, P., Palvia, S. and Zigli, R. (1992) In: Khorzrowpour, M. (ed.), *Global Information Technology Management*. Harrisburg, PA: Idea Group Publishing.
- Parasuraman, A., Zeithaml, A. and Berry, L. (1988) SERVQUAL: A Multiple-item Scale for Measuring User Perceptions of Service Quality, *Journal of Retailing*, **64** (1), 12-40.
- Patton, M. and University of California, (1987) *How to Use Qualitative Methods in Evaluation*, 2nd Edition, Newbury Park, CA: Sage.
- Payton, F. and Brennan, P. (1999) How a Community Health Information Network is Really Used, *Communications of the ACM*, **42** (12), 85-89.
- Peterson, D. and Kim, C. (2003) Perceptions on IS Risks and failure types: A Comparison of Designers from the United States, Japan and Korea, *Journal of Global Information Management*, **11** (3), 19-38.
- Peterson, D., Kim, C., Kim, J. and Tamura, T. (2002) The Perception of Information Systems Designers from The United States, Japan, and Korea on Success and Failure Factors, *International Journal of Information Management*, **22** (6), 421-439.
- Petter, S., DeLone, W., McLean, E. (2008) Measuring Information Systems Success: Models, Dimensions, Measures and Interrelationships, *European Journal of Information Systems*, **17** (3), 236-263.

- Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. and Pahnla, S. (2004) Consumer Acceptance of On-line Banking: An Extension of the Technology Acceptance Model, [Online], *Internet Research*, **14** (3), 224-235, Available www.emeraldinsight.com/1066-2243.htm [Accessed 4/10/2006].
- Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. and Pahnla, S. (2006) The Measurement of End-user Computing Satisfaction of On-line Banking Services: Empirical Evidence from Finland, *International Journal of Bank Marketing*, [Online], *Internet Research* **24** (3), 158-172, Available www.emeraldinsight.com/0265-2323.htm , [Accessed 4/10/2006].
- Pinsonneault, A. and Kraemer, K. (1993) Survey Research Methodology in Management Information Systems: An Assessment, *Journal of Management Information Systems*, **10** (2), 75-106.
- Pinto, J. and Slevin, D. (1987) Critical Factors in Successful Project Implementation, *IEEE Transactions on Engineering Management*, **EM-34** (1), 22-27.
- Pitt, L., Watson, R. and Kavan, C. (1995) Service Quality: A Measure of Information Systems Effectiveness, *MIS Quarterly*, **19** (2), 173-185.
- Poon, P. and Wagner, C. (2001) Critical Success Factors Revisited: Success and Failure Cases of Information Systems for Senior Executives, *Decision Support Systems*, **30** (4), 393-418.
- Poston, R. and Speier, C. (2005) Effective Use of Knowledge Management Systems: A Process Model of Content Ratings and Credibility Indicators, *MIS Quarterly*, **29** (2), 221-244.
- Prybutok, V., Zhang, X. and Ryan, S. (2008) Evaluating Leadership, IT Quality, and Net Benefits in an E-government Environment, *Information and Management*, **45** (3), 143-152.
- Rai, A. and Al-Hindi, H. (2000) The Effects of Development Process Modeling and Task Uncertainty on Development Quality Performance, *Information & Management*, **37** (3), 335-346.

- Rai, A. Lang, S. and Welker, R. (2002) Assessing the Validity of IS Success Models: An Empirical Test and Theoretical Analysis, *Information Systems Research*, **13** (1), 50-69.
- Rajan, R. (1998) The Past and Future of Commercial Banking - Viewed Through an Incomplete Contract Lens, *Journal of Money, Credit and Banking*, **30** (3), 524-50.
- Reeves, C. and Bednar, D. (1994) Defining Quality: Alternatives and Implication, *Academy of Management Review*, **19** (3), 419-445.
- Remenyi, D., Money, A., Williams, B. and Swartz, E. (1998) *Doing Research in Business and Management: An Introduction to Process and Method*, London: Sage.
- Richard, T., Leyland, F. and Kavan, C. (1995) Service Quality: A Measure of Information System Effectiveness, *MIS Quarterly*, **19** (2), 173-188.
- Riege, A. (2003) Validity and Reliability Tests in Case Study Research: A Literature Review with "Hands-on" Applications for each Research Phase, *Qualitative Market Research: An International Journal*, **6** (2), 75-86.
- Rivard, S., Poirier, G., Raymond, L. and Bergeron, F. (1997) Development of a measure to assess the quality of user-developed applications, *The Data Base for Advances in Information Systems*, **28** (3), 44-58.
- Roach, S. (1987) *America's Technology Dilemma: A Profile of Information Economy*, Morgan Stanley Special Economic Study. In Almutiari, H. (2001), Doctoral Thesis, Pennsylvania State University.
- Robey, D. (1979) User Attitudes and Management Information Systems Use, *Academy of Management Journal*, **22** (3), 527-538.
- Robey, D., Farrow, D. and Franz, C. (1989) Group Process and Conflict in System Development, *Management Science*, **35** (10), 1172-1191.
- Robey, D. and Zeller, R. (1978) Factors Affecting the Success and Failure of an Information System for Product Quality, *Interfaces*, **8** (2), 70-75.

- Robson, C. (2002) *Real World Research: A Resource for Social Scientists and Practitioners-Researchers*, 2nd Edition, Oxford: Blackwell.
- Roca, J., Chiu, C. and Martinez, F. (2006) Understanding E-learning Continues Intension: An Extension of the Technology Acceptance Model, *International Journal of Human-Computer Science*, **64**, 683-696.
- Roche, E. (1992) *The International Crisis in Transnational Computing*, New Delhi: Tata, McGraw-Hill.
- Rogerson, S., Foley, P. and Jayewardene, C. (1999) *Is Electronic Commerce a Socially Beneficial Activity?* In: Armitage, J. and Roberts, J., *Exploring Cyber Society*, Proceedings of the Exploring Cyber Society Conference, Newcastle, UK.
- Romi, I., Awad, I. and Elkordy, M. (2008) A Model of Organisational Politics Impact on Information Systems Success, [Online], Internet Research, Available from <http://www.alex.eg/publications.jsp> [Accessed 26/7/2008].
- Rose, G. and Straub, D. (1998) Predicting General IT Use: Applying TAM to the Arabic World, *Journal of Global Information Management*, **6**(3), 39-46.
- Ross, J. and Weill, P. (2002). Six IT Decisions Your IT People Shouldn't Make, *Harvard Business Review*, **80**(11), 84.
- Ruane, J. (2005) *Essentials of Research Methods: A Guide to Social Science Research*, Oxford: Blackwell.
- Sabherwal, R. (1999) The Relationship between Information System Planning Sophistication and Information System Success: An Empirical Assessment, *Decision Sciences*, **30** (1), 137-167.
- Sabherwal, R., Jeyaraj, A. and Chowa, C. (2006) Information Systems Success: Individual and Organizational Determinants, *Management Science*, **52** (12), 1849-1864.
- Salehi, M. and Keramati, A. (2009) A Proposal Framework for Investigating Website Successes in the Context of E-banking: An Analytic Network Process (ANP) Approach, *MASAUM Journal of Computing*, **1** (2), 304-308.

- Sanders, G. (1984) MIS/DSS Success Measure, *Systems Objectives and Solutions*, **4**, 295-314.
- Sanders, G. and Courtney, J. (1985) A Field Study of Organizational Factors Influencing DDS Success, *MIS Quarterly*, **9** (1), 77-92.
- Sarker, S. and Lee, A. (2000) *Using a Case Study to Test the Role of Three Key Social Enablers in ERP Implementations*, International Conference on Information Systems ICIS, Brisbane, Australia.
- Sauer, C. (1993) *Why Information Systems Fail: A Case Study Approach*, Alfred Waller, Oxford shire.
- Sauer, C. (1999) Deciding the Future for IS Failures Not the Choice You Might Think. In: Currie, W. and Galliers, B. (1999) *Rethinking Management Information Systems*, Oxford University Press Inc., New York.
- Saunders, M., Lewis, P. and Thornhill, A. (2000) *Research Methods for Business Studies*, 2nd Edition, Harlow: Financial Times/ Prentice Hall.
- Schewe, C. (1976) The Management Information System User: Exploratory Behavioral Analysis, *Academy of Management Journal*, **19** (4), 577-590.
- Seddon, P. (1997) A Respecification and Extension of the DeLone and McLean Model of IS Success, *Information Systems Research*, **8** (3), 240-253.
- Seddon, P. and Kiew, M. (1994) A Partial Test and Development of the DeLone and McLean Model of IS Success, *Australian Journal of Information Systems*, **4** (1), 90-115.
- Seddon, P. and Yip, S. (1992) An Evaluation of User Information Satisfaction (UIS) Measures for Use with General Ledger Account Software, *Journal of Information Systems*, **5**, 75-92.
- Seddon, P., Staples, D., Patnayakuni, R. and Bowtell, M.J. (1999) The Dimensions of Information Systems Success, [Online], *Communications of the Association for Information Systems*, **2**, 20, Available at www.caais.isworld.org/articles [Accessed 15/9/2006].

- Sekaran, U. (1984) *Research Methods for Managers: A Skill Building Approach*, New York: John Wiley.
- Senn, J. (1982) *Information Systems in Management*, 2nd Edition, Belmont, Calif: Wadsworth.
- Sethi, V. And King, W. (1994) Development of Measures to assess the extent to which an Information Technology Application provides Competitive Advantage, *Management Science*, **40** (12), 1601-1627.
- Shannon, C. and Weaver, W. (1949) *The Mathematical Theory of Communication*, Urbana, Ill: University of Illinois Press.
- Sharif, A. M., Elliman, T., Love, P. and Badii, A. (2004) Integrating the IS with the Enterprise: Key EAI Research Challenge, *Journal of Enterprise Information Management*, **17** (2), 164-170.
- Sharma, R. and Yetton, P. (2003) The Contingent Effects of Management Support and Task Interdependence on Successful Information Systems Implementation, *MIS Quarterly*, **27** (4), 533-555.
- Shashaani, L. and Khalili, A. (2001) Gender and computers: similarities and differences in Iranian college students' attitudes toward computers, *Computers & Education*, **37** (3-4), 41-51.
- Shaw, N., DeLone, W. and Niederman, F. (2002) Sources of Dissatisfaction in End-User Support: An Empirical Study, *The Data Base for Advances in Information Systems*, **33** (2), 41-56.
- Shih, H. (2004) Extended Technology Acceptance Model of Internet Utilisation Behaviour, *Information and Management*, **41** (6), 719-729.
- Simmers, C. and Anandarajan, M. (2001) User Satisfaction in Internet-Anchored Workplace: An Exploratory Study, *Journal of Information Technology Theory and Application*, **3** (5), 39-61.

- Skok, W., Kophamel, A. and Richardson, I. (2001) Diagnosing Information System Success: Importance-Performance Maps in the Health Club Industry, *Information and Management*, **38** (7), 409-419.
- Snow, C. and Thomas, J. (1994) Field Research Methods in Strategic Management: Contribution to Theory Building and Testing, *Journal of Management Studies*, **31** (4), 457- 480.
- Sohal, A., Moss, S. and Ng, L. (2001) Comparing IT Success in Manufacturing and Service Industries, *International Journal of Operations & Production Management*, **21** (1, 2), 30-45.
- Somers, T. and Nelson, K. (2001a) *The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementations*, Hawaii International Conference on Systems Sciences.
- Somers, T. and Nelson, K. (2001b) *Organizations and ERP Systems: Conceptualizing the Fit*, Orlando, FL: Production and Operations Management Society.
- Specht, P. (1986) Job Characteristics as Indicative of CBIS Data Requirements, *MIS Quarterly*, **10** (3), 271-287.
- Sproull, N. (1988) *Handbook of Research Methods: A Guide for Practitioners and Students in the Social Science*, Metuchen, N.J. & London: The Scarecrow Press.
- Srinivasan, A. (1974) Alternative Measures of System Effectiveness: Association and Involvement, *Management Science*, **21** (2), 178-188.
- Srinivasan, A. (1985) Alternative Measures of System Effectiveness: Associations and Implications, *MIS Quarterly*, **9** (3), 243-253.
- Strachman, D. (1994) PCs are catching on Faster at Community Banks, *American Banker*, **159** (156), 4-6.
- Strassmann, P. (1997) *Will Big Spending on Computers Guarantee Profitability?* [Online] Datamation , Available from www.strassmann.com [Accessed in 4/10/2006].

- Straub, D. (1989) Validating Instruments in MIS Research, *MIS Quarterly*, **13** (2), 147-156.
- Straub, D. (1994) The Effect of Cultural on IT Diffusion: Email and Fax in Japan and the USA, *Information Systems Research*, **5**, 23-47.
- Straub, D., Limayem, M. and Karahanna-Evaristo, E. (1995) Measuring System Usage: Implications for IS Theory Testing, *Management Science*, **41** (8), 1328-1342.
- Straub, D., Loch, K., and Hill, C. (2001) Transfer of Information Technology to the Arabic World: A Test of Cultural Influence Modelling, *Journal of Global Information Management*, **9** (4), 6-28.
- Subramanian, G. (1994) A Replication of Perceived Usefulness and Perceived Ease of Use Measurement, *Decision Science*, **25** (5/6), 863-874.
- Sumner, M. (1999) *Critical Success Factors in Enterprise Wide Information Management Systems Projects*, Americas Conference on Information Systems AMCIS, Milwaukee, USA.
- Sumner, M. (2000) Risk Factors in Enterprise-Wide/ERP Projects, *Journal of Information Technology*, **15** (4), 317-28.
- Swanson, E. (1974) Management Information Systems: Appreciations and Involvement, *Management Science*, **21** (2), 178-188.
- Swanson, E. (1994) Information Systems Innovations among Organisations, *Management Science*, **40** (9), 1069-1092.
- Taylor, A. (2004) Computer-Mediated Knowledge Sharing and Individual User Differences: An Exploratory Study, *European Journal of Information Systems*, **13** (1), 52-64.
- Taylor, R. (1975) Age and Experience as Determinates of Managerial Information Processing and Decision Making Performance, *Academy of Management Journal*, **18** (1), 74-81.

- Taylor, S. and Baker, T. (1994) An Assessment of the Relationship between Service Quality and Customer Satisfaction in the Formation of Consumers' Purchase Intentions, *Journal of Retailing*, **70** (2), 163-178.
- Taylor, S. and Todd, P. (1995) Assessing IT Usage: The Role of Prior Experience, *MIS Quarterly*, **19** (4), 561-570.
- Teixeira, D. (1995) Technology Investments have led to Excess Banking Capacity, *American Banker*, 160, 24, 8.
- Tenenhaus, M., Esposito, V., Chatelin, Y. and Laura, C. (2005) PLS Path Modeling. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Teng, J. and Calhoun, K. (1996) Organizational Computing as a Facilitator of Operational and Managerial Decision Making: An Exploratory Study of Managers' Perceptions, *Decision Sciences*, **27** (4), 673-710.
- Teo, T. and Ang, J. (2001) An Examination of Major IS Planning Problems, *International Journal of Information Management*, **21** (6), 457-470.
- Teo, T. and King, W. (1997) Integration between Business Planning and Information Systems Planning: An Evolutionary-Contingency Perspective, *Journal of Management Information Systems*, **14** (1), 185-214.
- Teo, T. and Tan, M. (2000) Factors Influencing the Adoption of Internet Banking, *Journal of the Association for Information Systems*, **1** (5), 1-42.
- Teo, T. and Wong, P. (1998) An Empirical Study of the Performance Impact of Computerization in the Retail Industry, *Omega*, **26** (5), 611-621.
- Thomas, P., Van Dyke, T., Kappelman, L. and Prybutok, V. (1997) Measuring Information Systems Service Quality: Concerns on the Use of the SERVQUAL Questionnaire, *MIS Quarterly*, **21** (2), 195-209.
- Thompson, R., Higgins, C. and Howell, J. (1991) Personal Computing: Toward a Conceptual Model of Utilisation, *MIS Quarterly*, **15** (1), 125-143.

- Thong, J., Yap, C. and Raman, K. (1996) Top Management Support, External Expertise and Information Systems Implementation in Small Business, *Information Systems Research*, **7** (2), 248-268.
- Torkzadeh, G. and Doll, W. (1991) Test-retest Reliability of the End-user Computing Satisfaction Instrument, *Decision Sciences*, **22** (1), 26-37.
- Torkzadeh, G. and Doll, W. (1994) The Test-retest Reliability of User Involvement Instrument, *Information and Management*, **26** (1), 21-31.
- Torkzadeh, G., and Doll, W. (1999) The Development of a Tool for Measuring the Perceived Impact of Information Technology on Work, *Omega-The International Journal of Management Science*, **27** (3), 327-339.
- Trochim, W. (2001) *Research Methods Knowledge Base*, Atomic Dog Publishing: Cincinnati.
- Truman, G. and Baroudi, J. (1994) Gender Differences in the Information Systems Managerial Ranks: An Assessment of Potential Discriminatory Practices, *MIS Quarterly*, **18** (2), 129-141.
- Tsai, C., Lin, S., and Tsai, M. (2001) Developing an Internet attitude scale for high school students, *Computers & Education*, **37** (1), 41-51.
- Twati, J. (2008) The Influence of Societal Culture on the Adoption of Information Systems: The Case of Libya, *Communications of the IIMA*, **8** (1), 1-12.
- Van de Ven, A. and Ferry, D. (1980) *Measuring and Assessing Organizations*, Chichester, England: John Wiley.
- Van Dyke, T., Kappelman, L. and Prybutok, V. (1999) Cautions on the Use of the SERVQUAL Measure to Assess the Quality of Information Systems Service, *Decision Sciences*, **30** (3), 877-891.
- Vasarhelyi, M. (1977) Man-made Planning Systems: A Cognitive Style Examination of Interactive Decision Making, *Journal of Accounting Research*, **15** (1), 138-153.

- Vasarhelyi, M. (1981) *Information Processing in a Simulated Stock Market Environment*, Proceedings of Second International Conference on Information Systems, 53-75.
- Venkatesh, V., Morris, M. , Davis. G. and Davis, F. (2003) User acceptance of information technology: toward a unified view, *MIS Quarterly*, **27**(3), 425-478.
- Walsham, G. (2001) *Making a World of Difference: IT in a Global Context*. John Wiley, Chichester.
- Wang, Y. (2008) Assessing E-commerce Systems Success: a Respecification and Validation of the DeLone and McLean Model of ID Success, *Information Systems Journal*, **18** (5), 529-557.
- Wang, S. and Hanafi, A. (2007) Gender Differences in Attitudes towards Information Technology among Malaysian Student Teachers: A Case Study at University Putra Malaysia, *Educational Technology & Society*, **10** (2), 158-169.
- Wang, Y. and Liao, Y. (2008) Assessing e-Government Systems Success: A Validation of the DeLone and McLean Model of Information Systems Success, *Government Information Quarterly*, **25**, 717-733.
- Wasko, M. and Faraj, S. (2000) It Is What One Does: Why People Participate and Help Others in Electronic Communications of Practice, *Journal of Strategic Information Systems*, **9**, 155-173.
- Watson, H., Rainer, K. and Houdeshel, G. (1997) *Building Executive Information Systems and Other Decision Support Applications*, New York: John Wiley.
- Weill, P. (1992) The Relationship between Investment in Information Technology and Firm Performance: A Study of the Value Manufacturing Sector, *Information Systems Research*, **3** (4), 307-333.
- Weill, P., Subramani, M. and Broadbent, M. (2002) Building IT Infrastructure for Strategic Agility, *MIT Sloan Management Review*, **44** (1), 57-65.

- Weill, P. and Vitale, M. (1999) Assessing the Health of an Information System Portfolio: An Example from Process Engineering, *MIS Quarterly*, **23** (4), 601-624.
- Weill, P. and Vitale, M. (2002) What IT Infrastructure Capabilities are needed to Implement E-business Models, *MIS Quarterly Executive*, **1** (1), 17-34.
- Weiss, N. (1995) *Introductory Statistics*, 4th Edition, Addison- Wesley.
- Welford, A. (1980) Sensory, perceptual, and motor processes in older adults. In Birren JE, Sloane R (Eds.), *Handbook of mental health and aging* (pp. 192-213). Englewood.
- Wetherbe, J., Vitalari, N. and Milner, A. (1994) Key Trends in Systems Developments in Europe and North America, *Journal of Global Information Management*, **2** (2), 5-20.
- Wilkin, C. and Hewitt, B. (1999) *Quality in a Respecification of DeLone and McLean's IS Success Model*. Proceedings of 1999 IRMA International Conference.
- Wilkin, C., Hewitt, B. and Carr, R. (2004) Exploring the Role of Expectations in Defining Stakeholders' Evaluations of IS Quality. In: Medina, M. and Chaparro, J. (2008) The Impact of the Human Element in the Information System Quality for Decision Making and User Satisfaction, *The Journal of Computer Information Systems*, **48** (2), 44-52.
- Willcocks, L. and Stykes, R. (2000) The Role of the CIO and IT Function in ERP, *Association for Computing Machinery*, **43** (4), 32-8.
- Wilson, M. and Howcroft, D. (2002) Re-conceptualising Failure: Social Shaping Meets IS Research, *European Journal of Information Systems*, **11**, 236- 250.
- Wilson, H. and McDonald, M. (1996) Computer-aided Marketing Planning: The Experience of Early Adopters, *Journal of Marketing Management*, **12** (5), 391-415.
- Wixom, B. and Todd, P. (2005) A Theoretical Integration of User Satisfaction and Technology Acceptance, *Information Systems Research*, **16** (1), 85-102.

- Wixom, B. and Watson, H. (2001) An Empirical Investigation of the Factors Affecting Data Warehousing Success, *MIS Quarterly*, **25** (1), 17-41.
- Wold, H. (1985) Partial Least Squares. In: Henseler, J., Ringle, C. and Sinkovics, R. (2008) The Use of Partial Least Squares Path Modeling in International Marketing, *Advances in International Marketing*, 1-43.
- Woodroof, J. and Kasper, G. (1998) A Conceptual Development of the Process and Outcome of User Satisfaction, *Information Resources Management Journal*, **11** (1), 37-42.
- Wu, J. and Wang, Y. (2006) Measuring KMS Success: A Respecification of the DeLone and McLean Model, *Information and Management*, **43** (6), 728-739.
- Yang, Z. and Fang, X. (2004) On-line Service Quality Dimensions and their Relationships with Satisfaction: A Content Analysis of Customer Reviews of Securities Brokerage Service, *International Journal of Service Industry Management*, **15** (3), 302-326.
- Yang, Z., Jun, M. and Peterson, R. (2004a) Measuring Customer perceived on-line Service Quality, Scale Development and Managerial Implications, *International Journal of Operations and Production Management*, **24** (11), 1149- 1174.
- Yang, Z., Jun M. and Kim, D. (2004b) Customers` Perceptions of On-line Retailing Service Quality and their Satisfaction, *International Journal of Quality and Reliability Management*, **21** (8), 817-840.
- Yaverbaum, G. (1988) Critical Factors in the User Environment: An Experimental Study of User, Organizations, and Tasks, *MIS Quarterly*, **12** (1), 75-88.
- Yi, Y., Wu, Z. and Tung, L. (2005-2006) How individual differences influence technology usage behavior? Toward an integrated framework, *Journal of Computer Information Systems*, **46**(2), 52-63.
- Yin, R. (1989) *Case Study Research, Design and Methods*, London, UK: Sage.
- Yin, R. (2003) *Applications for Case study Research*, Thousand Oaks and London: Sage.

- Yoon, Y. and Guimaraes, T. (1995) Assessing Expert Systems Impact on Users' Job, *Journal of Management Information Systems*, **12** (1), 225-249.
- Yoon, Y., Guimaraes, T. and O'Neai, Q. (1995) Exploring the Factors Associated with Expert System Success, *MIS Quarterly*, **19** (1), 83-106.
- Young, S. and Yuthas, K. (1998) Material Matters: Assessing the Effectiveness of Materials Management IS, *Information and Management*, **33** (3), 115-124.
- Yuthas, K. and Young, S. (1998) Material Matters: Assessing the Effectiveness of Materials Management IS, *Information and Management*, **33** (3), 115-124
- Zenger, T. and Lawrence, B. (1989) Organizational Demography: The Differential Effects of Age and Tenure Distributions on Technical Communications, *Academy of Management Journal*, **32** (2), 353-376.
- Zikmund, W. (2003) *Business Research Methods*, Mason, OH and Great Britain: Thomson/South-Western.
- Zhang, Z., Lee, M., Huang, P., Zhang, L. and Huang, X. (2004) *A Framework of ERP Systems Implementation Success in China: An Empirical Study*, [Online], Available at www.sciencedirect.com [Accessed 11/11/2006].
- Zmud, R. (1979) Individual Differences and MIS Success: A Review of Empirical Literature, *Management Science*, **25** (5), 966-979.
- Zviran, M., Pliskin, N. and Levin, R. (2005) Measuring User Satisfaction and Perceived Usefulness in the ERP Context, *The Journal of Computer Information Systems*, **45** (3), 43-52.

Appendices

Appendix A: English version of questionnaire

Dear Sir/ Madam

I am undertaking PhD research into the success of information systems in the banking industry. This research is sponsored by the Egyptian government and carried out with the help of Bradford University (School of Management) UK.

I am interested in knowing whether the information system in your organisation is successful or not. How do you measure the success of your information system? And are you sure that the measures you use are the appropriate ones?

In my research, I am investigating how to examine the success of information systems in the Egyptian banking industry. The enclosed survey is designed to gather information about the different measures used to evaluate information systems' success.

I would be highly appreciative if you would take part in this important study by completing the attached survey questionnaire. I would value your contribution if you would kindly think about the information systems that you are using in your organization to assist you in your work. Then please read the questions carefully and choose the answers that most match your opinions, impressions and perceptions about the information systems.

Therefore, your participation in this study is vital for its success. Participation in this study voluntary. If you decide to take part, please read carefully the instructions and answer all questions without discussing them with anyone. There are no right or wrong answers to these questions. Usually, your first reaction to the question is a good indicator of how you feel. After completing the questionnaire, please return it to me.

Your answers will be kept strictly confidential. No one other than me will be allowed to have access to your answers and individual responses will be anonymous. The questionnaire has been designed to minimize your effort and I anticipate that it will take no more than 20-25 minutes to complete all of the sections. I know you are busy, so I am very grateful to you for taking the time to answer. Since the success of this study is highly dependent on the number of questionnaires returned, your valuable input therefore becomes very important.

I would be pleased to send you an executive summary of the key research findings and once again I would like to thank you for your support and kind co-operation.

Yours faithfully,

Safaa Hussein (Mrs.)

Email: s.a.m.hussien@bradford.ac.uk

safaa26bedo@yahoo.com

Section 1. Questions 1 to 8 are about you.

1. Your job title.....
2. How long have you been in this position?..... (Years)..... (Months).
3. Your gender: male () female ()
4. Your age: Less than 20 () 20-29 () 30-39 () 40-49 () 50 and over ()
5. Your education:
Less than high school () high school () high school and some college ()
bachelor () master () doctorate ()

How many years have you been working:

6. in the banking industry?

Less than one year () 1-5 years () 6-10 years () 11-15 years ()
16-20 years () 21-25 years () over 26 years ()

7. in your current bank?

Less than one year () 1-5 years () 6-10 years () 11-15 years ()
16-20 years () 21-25 years () over 26 years ()

8. with information systems (computers) (Years)..... (Months)

Section 2. For questions 9 to 15, please tick the answer box that most closely matches your perception of your information system quality.

	System Quality				
	strongly agree	agree	no opinion	disagree	strongly disagree
9. It is difficult for me to use the capability of the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. The system provided can be highly trusted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. The system is flexible and can change in response to new demands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.The elapsed time between a user's demand for service from the information system and reply to that demand is fast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.The ability of the system to transmit data between different functional departments within my organisation is high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.The relative balance between the costs and benefits of the system is positive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. The wording and vocabulary used to interact with the system are easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 3. For questions 16 to 24, please tick the answer box that most closely matches your perception of the information quality.

	Information Quality				
	strongly agree	agree	no opinion	disagree	strongly disagree
16. There is a lot of redundancy in the amount of information conveyed to me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Dependability of the output information is sufficient for me to do my job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Content of the output information is sufficiently comprehensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Output information is adequately correct for my purposes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. There is a consistency between actual output information in general and information that should be produced by the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Output information is current and up to date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Format and layout of the information is readable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. The information system provides information when I need it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. There is a high degree of congruence between what I require from the information system and what is provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 4. For questions 25 to 48, please indicate the extent to which you believe the

IS department (IS) has the features described by each statement. All we are interested in is the answer that most closely matches your perceptions about your IS department (please respond to ALL the statements).

	Service Quality				
	strongly agree	agree	no opinion	disagree	strongly disagree
25. IS department has up to date hardware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. IS department has up to date software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. IS department physical facilities are visually appealing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. IS department employees are well dressed and neat in appearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Appearance of IS physical facilities department, is in keeping with the kind of service provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. When the IS department promises to do something by a certain time, it does so	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. When users have a problem, the IS department is committed to solving it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. IS department is dependable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

33. IS department provides its services at the time it promises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. IS department insists on providing error-free records	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. IS department will tell users exactly when services will be performed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. IS department's employees give prompt service to users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. IS department's employees are always willing to help users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. IS department's employees are never too busy to respond to user requests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. The behaviour of IS department employees instils confidence in users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Users feel safe in their transactions with IS department employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. IS department employees are consistently courteous with users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. IS department employees have the knowledge to do their job well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. IS department gives users individual attention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. IS department has operating hours convenient to all its users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. IS department has employees who give users personal attention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. IS department has users' best interests at heart	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. IS department employees understand the specific needs of its users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Quality of service provided by the IS department is excellent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 5. For questions 49 to 52, please choose the appropriate answer that most

Matches your description of the level of training received and user involvement.

49. When the information system was first used in your department, how much training did you receive?

1. No training on the information system beforehand ☐
2. Some training but inadequate to enable me to use the system effectively ☐
3. Adequate training to enable me to use the system effectively ☐

50. When the information system was first used in your department, did you receive:

1. On-site training ☐
2. Off-site training ☐

	strongly agree	agree	no opinion	disagree	strongly disagree
51- When the information system was first used in your department, did you feel completely prepared	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52- Users are fully involved in the design and development of new information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 6. For questions 53 to 59, please tick the answer box that most matches your impressions regarding Top management support.

	Top Management Support				
	strongly agree	agree	no opinion	disagree	strongly disagree
53- Top management involvement with information systems is strong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54- Top management is interested in information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55- Top management understands the importance of information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56- Top management supports the information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57- Top management considers information systems as a strategic resource	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58- Top management understands information systems opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59- Top management keeps the pressure on operating units to work with information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 7. For questions 60 to 63, Please tick the most appropriate answer that describes your usage of the information system.

60. On an average working day that you use a computer, how long do you spend on the information system?

- | | |
|---|---|
| <input type="checkbox"/> Almost never | <input type="checkbox"/> Less than 30 minutes |
| <input type="checkbox"/> More than 30 minutes to 1 hour | <input type="checkbox"/> More than 1 to 2 hours |
| <input type="checkbox"/> More than 2 to 3 hours | <input type="checkbox"/> More than 3 hours |

61. On average, how frequently do you use the information system?

- ☐ Almost never
 ☐ Once a month
 ☐ A few times a month
☐ A few times a week
 ☐ About once a day
 ☐ Several times a day

62. With respect to the requirements of your current job, please indicate to what extent you use the information system to perform the following tasks (please tick one in each task).

	not at all	a little	moderately	much	great extent
62/1 Looking for trends of historical reference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/2 Finding problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/3 Planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/4 Budgeting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/5 Communicating with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/6 Controlling and guiding activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/7 Making decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62/8 Other, please specify	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

63. With respect to the requirements of your current job, please indicate which packages you use from the following (please check)

- Spreadsheets. ☐
 Word processing. ☐
 Data management packages. ☐
 Modelling systems. ☐
 Statistical systems. ☐
 Graphical packages. ☐
 Communication packages. ☐
 Own programming. ☐
 4GL. ☐
 Others. Please specify ☐

Section S8. For questions 64 to 67, please choose the answer which best reflects your overall satisfaction with your information system.

	Overall Satisfaction with your information system				
	strongly agree	agree	no opinion	disagree	strongly disagree
64- The information system fully meets the information needs of my area of responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65- The information system is efficient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66- The information system is effective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67- Overall, I am satisfied with the information system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section S9- For questions 68 to 77, please indicate the extent to which information systems have impacted on your job in the following areas.

	strongly agree	agree	no opinion	disagree	strongly disagree
68- Information system permits me to accomplish a great deal more work than would otherwise be possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69- Information system applications save time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70- Information system increases productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71- Information system helps me to try out innovative ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72- Information system helps me to meet customer needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73- Information system improves customer service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74- Information system provides customer satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75- Information system improves management control on the work process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76- Information system helps management to control performance and correct errors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
77- Information system enables management to ensure a timely completion of tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you would like to add any comments either on the topic covered by the questionnaire or on the questionnaire itself, please do so in this space.

--

Thank you for your kind cooperation which is much appreciated. If you would like a copy of the executive summary of the key research findings, please provide details for correspondence below.

End of questionnaire

Appendix B: Arabic version of questionnaire

سيدى الفاضل/ سيدتى الفاضلة

تحية طيبة و بعد

كيف تتحقق من أن نظام المعلومات فى ادارتك ناجح أو غير ناجح؟ و ما هى المعايير التى تستخدمها لقياس نجاح نظام المعلومات؟ و هل أنت واثق تماما بأن هذه المعايير هى الانسب؟

كجزء من متطلبات درجة الدكتوراه فى نظم المعلومات الادارية بجامعة برادفورد بالمملكة المتحدة , فأننى أحاول إيجاد نموذج متكامل لتقييم نظم المعلومات فى القطاع المصرفى المصرى (البنوك) .

تهدف قائمة الاستقصاء لجمع معلومات حول المعايير المختلفة التى تستخدم عادة لتقييم نجاح نظم المعلومات , هذه المعلومات سوف تلعب دورا مهما فى إيجاد النموذج المتكامل لتقييم نظم المعلومات فى القطاع المصرفى المصرى . و بناء عليه , فإنه من دواعى سرورى مقدرتكم على تكملة قائمة الاستقصاء المرفقة حيث أن مشاركتكم فى هذه الدراسة ضرورية جدا لتحقيق هدفها.

سيدى الفاضل/ سيدتى الفاضلة

عند قراءة قائمة الاستقصاء برجاء مراعاة الاتى :

- المشاركة فى هذه الدراسة تطوعية
 - إذا قررت المشاركة , أرجو قراءة الاسئلة و الارشادات الخاصة بكل سؤال بدقة مع عدم مناقشة الاسئلة مع اى احد .
 - لا توجد اجابة صحيحة أو خاطئة للاسئلة , المطلوب هو وضع انطباعتك الاول بعد قراءة كل سؤال .لذلك لا تقف طويلا عند سؤال واحد.
 - لك مطلق الحرية فى ذكر الاسم أو رقم الهاتف.
 - عند الانتهاء من الاجابة على قائمة الاستقصاء , أرجو تسليمه للشخص المعنى , تسليمك لقائمة الاستقصاء تعتبر موافقة ضمنية للمشاركة فى الدراسة.
 - جميع الاجابات سوف تحاط بسرية تامة , هذا الاستبيان سوف يستخدم فقط من أجل تحقيق أهداف الدراسة.
 - فى حالة الرغبة فى معرفة ملخص نتائج الدراسة , الرجاء الاتصال عن طريق البريد الالكترونى المذكور أدناه أو ملء المربع الصغير فى نهاية الاستبيان.
- نحن نتطلع لأن نتلقى استبيانكم الكامل فى المستقبل القريب . أخيرا , أعبر لكم عن جزيل شكرى و تقديرى لتعاونكم و بذلك الوقت و الجهد للجابة على قائمة الاستقصاء .

صفاء أحمد محمود حسين

مدرس مساعد بقسم ادارة الاعمال

كلية التجارة – جامعة الاسكندرية

بريد الكترونى : safaa26bedo@yahoo.com

s.a.m.hussien@bradford.ac.uk

القسم الاول: برجاء اختيار الاجابة التى تدل على تقييمك لجودة نظام المعلومات (الحاسب الالى/ كمبيوتر). برجاء اختيار اجابة واحدة لكل

سؤال. من السؤال 1 الى السؤال 7

جودة نظام المعلومات				
أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1- من الصعوبة استخدام الامكانيات الموجودة فى نظام المعلومات				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2- الثقة فى مخرجات نظام المعلومات عالية				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3- يمكن لنظام المعلومات التغير بمرونة لمواكبة ظروف جديدة أو متطلبات جديدة				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4- الزمن المنقضى ما بين قيام مستخدمى نظم المعلومات بطلب معلومات أو خدمة معينة من نظام المعلومات و بين حصولهم على هذه المعلومات أو الخدمة سريع				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5- قدرة نظام المعلومات على توصيل و نقل المعلومات ما بين مختلف الادارات كافيه				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6- التوازن النسبى ما بين تكاليف نظام المعلومات و الفائدة التى تحققت من هذا النظام ايجابية				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7- الكلمات و تركيب الجمل و الاوامر المستخدمة لتشغيل نظام المعلومات سهلة				

القسم الثانى: برجاء اختيار الاجابة التى تدل على تقييمك لجودة المعلومات التى يقدمها نظام المعلومات (الحاسب الالى/ كمبيوتر). برجاء اختيار اجابة واحدة لكل سؤال. من السؤال 8 الى السؤال 16

جودة المعلومات				
أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8- كمية المعلومات المستخرجة من نظام المعلومات غزيرة				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9- ثبات و مصداقية المعلومات المستخرجة من نظام المعلومات كافية لاداء مهامك الوظيفية				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10- شمولية المعلومات المستخرجة من نظام المعلومات كافية لاداء مهامك الوظيفية				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11- صحة المعلومات المستخرجة من نظام المعلومات كافية لاداء مهامك الوظيفية				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12- يوجد اتساق بين المعلومات المستخرجة من نظام المعلومات بصفة عامة و بين المعلومات المقروض الحصول عليها				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13- نظام المعلومات يوفر معلومات حديثة				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14- الشكل النهائى (الخارجى) للمعلومات المستخرجة جيد و مقروء				

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15- نظام المعلومات يوفر المعلومات في الوقت المناسب الذي فيه هذه المعلومات مطلوبة لاستخدامها
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16- يوجد تناسب بين ما تريده من نظام المعلومات و بين ما ينتجه نظام المعلومات من معلومات و خدمات

القسم الثالث: هذا القسم يتعلق بإدارة نظم المعلومات (إدارة الحاسب الالى). من واقع خبرتك كمستخدم لنظام المعلومات , الى أى مدى تعتقد ان ادارة نظم المعلومات تمتلك الموصفات (المميزات) المذكورة أدناه؟

أرجو اختيار الاجابة الذى تعبر بصدق عن ادراكك الفعلى فيما يتعلق بجودة الخدمة المقدمة من ادارة نظم المعلومات فى منظمتك .

(يرجاء الاجابه على جميع الاسئلة , من السؤال 17 الى السؤال 40)

جوده الخدمة					
أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17- لدى ادارة نظم المعلومات hardware محدث دائما
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	18 - لدى ادارة نظم المعلومات software محدث دائما
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	19- لدى ادارة نظم المعلومات تسهيلات مادية مغريه
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20- لدى ادارة نظم المعلومات موظفين ذوى مظهر لائق
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	21- يوجد تناسق أو توافق بين التسهيلات المادية لدى ادارة نظم المعلومات و نوعية الخدمات المقدمة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	22- تلتزم ادارة نظم المعلومات دائما بتحقيق الوعود التى قطعها على نفسها
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	23- عندما يواجه المستخدم مشكلة , فان ادارة نظم المعلومات تبدى اهتمام مخلص لحلها
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24- يمكن الاعتماد على ادارة نظم المعلومات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	25- تقدم ادارة نظم المعلومات خدماتها فى الوقت المناسب و الذى قد وعدت به
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	26- تصر ادارة نظم المعلومات على توفير سجلات و تقارير خاليه من الاخطاء
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	27- تخبر ادارة نظم المعلومات المستخدمين بدقة عن موعد تقديم الخدمات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28- يقدم العاملون بادارة نظم المعلومات الخدمة السريعة للمستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	29- العاملون بادارة نظم المعلومات دائما على استعداد لمساعدة المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30- لن ينشغل العاملون بادارة نظم المعلومات ابدا عن الاستجابة لطلبات المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	31- يغرس سلوك العاملين بادارة نظم المعلومات الثقة فى نفوس المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	32- يشعر المستخدمون بالامان فى تعاملاتهم مع العاملين فى ادارة نظم المعلومات

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	33- العاملون بإدارة نظم المعلومات مهذبون دائما مع المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	34- لدى العاملين بإدارة نظم المعلومات العلم و المعرفة اللازمة للقيام بوظيفتهم على نحو جيد
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	35- تولى إدارة نظم المعلومات اهتمامها لكل فرد من المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	36- لدى إدارة نظم المعلومات ساعات عمل او تشغيل مناسبة لجميع المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	37- لدى إدارة نظم المعلومات عاملين يولون اهتمامهم الشخصي لكل فرد من المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	38- تهتم إدارة نظم المعلومات جدا بمصالح المستخدمين
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	39- يتفهم العاملون بإدارة نظم المعلومات احتياجات المستخدمين المحددة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	40- مستوى جودة الخدمة المقدمة من ادارة نظم المعلومات فى البنك ممتازة

القسم الرابع: أرجو اختيار الاجابة التى تعبر بصدق عن مستوى التدريب المقدم من ادارة نظم المعلومات .(برجاء اختيار اجابة واحدة لكل سؤال. من السؤال 41الى السؤال 44)

41- عند استخدام نظام المعلومات لأول مرة فى منظمتك , هل:

- لم تتلقى أى تدريب على نظام المعلومات.
- تلقيت بعض التدريب و لكنه غير كافى لاستخدام نظام المعلومات بفعالية.
- تلقيت تدريب كافى يمكننى من استخدام نظام المعلومات بفعالية.

42- عند استخدام نظام المعلومات فى منظمتك لأول مرة , هل تلقيت التدريب عل النظام:

- داخل المنظمة.
- خارج المنظمة.

أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

43- عند استخدام نظام المعلومات فى منظمتك لأول مرة , هل شعرت انك مستعد تماما لاستخدام النظام

44- يشارك مستخدمى نظام المعلومات فى عملية تصميم نظم المعلومات الجديدة

القسم الخامس: : أرجو اختيار الاجابة التى تعبر بصدق عن انطباعك فيما يتعلق بمساندة و دعم الادارة العليا لنظام المعلومات فى منظمتك.(برجاء اختيار اجابة واحدة لكل سؤال. من السؤال 45 الى السؤال 51)

مساندة و دعم الادارة العليا				
أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

45- ترتبط الادارة العليا بنظم المعلومات ارتباط قوى

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	46- تهتم الادارة العليا بنظم المعلومات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	47- تتفهم الادارة العليا أهمية نظم المعلومات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	48- تدعم الادارة العليا نظم المعلومات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	49- تعتبر الادارة العليا نظم المعلومات كمورد استراتيجي
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50- تتفهم الادارة العليا فرص نجاح نظم المعلومات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	51- تواصل الادارة العليا الضغط على وحدات التشغيل للعمل بنظام المعلومات

القسم السادس: أرجو اختيار الاجابة التي تعبر بصدق عن استخدامك لنظام / نظم المعلومات في منظمتك . (برجاء اختيار اجابة واحدة لكل سؤال , من السؤال 52 الى السؤال 55)

52- خلال ساعات العمل, كم ساعة تقضيها في استخدام نظام المعلومات (الكمبيوتر) ؟

(1) لا أستخدمة أبدا . (2) أقل من نصف ساعة

(3) من نصف ساعة الى ساعة (4) من ساعة الى ساعتين

(5) من ساعتين الى ثلاث ساعات (6) أكثر من ثلاث ساعات

53- في المتوسط, كم مرة تستخدم فيها نظام المعلومات ؟

(1) لا أستخدمة أبدا . (2) مرة واحدة في الشهر

(3) بضع مرات في الشهر (4) بضع مرات في الاسبوع

(5) مرة في اليوم (6) عدة مرات في اليوم

5. فيما يتعلق بمتطلبات الوظيفة التي تشغلها, أرجو اختيار الاجابة التي تعبر بصدق عن مدى استخدامك لنظام المعلومات في عمليات الادارية التالية: (أرجو اختيار اجابة واحدة لكل سؤال)

أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1/54- استخدام نظام المعلومات في التعرف على أو اكتشاف اتجاهات من خلال مراجعة عمليات أو معاملات ادارية سبق تنفيذها , على سبيل المثال, اكتشاف سبب مشترك أدى الى حدوث مشاكل ادارية

2/54- استخدام نظام المعلومات في اكتشاف المشاكل

3/54- استخدام نظام المعلومات في التخطيط

4/54- استخدام نظام المعلومات في عمل الميزانيات

5/54- استخدام نظام المعلومات في الاتصال مع الآخرين

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6/54- استخدام نظام المعلومات فى الاشراف و توجيه الأنشطة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7/54- استخدام نظام المعلومات فى اتخاذ القرارات

55. فيما يتعلق بمتطلبات الوظيفة التى تشغلها, أرجو تحديد عدد البرامج التى تستخدمها (يمكن اختيار أكثر من برنامج واحد):

- (1) معالج حسابات
(2) معالج كلمات
(3) قواعد بيانات
(4) برامج عمل نماذج
(5) برامج عمل احصاءات
(6) برامج عمل رسم
(7) برامج اتصالات
(8) برمجة / برمجة متطورة
(9) برامج أخرى

القسم السابع: أرجو اختيار الاجابة التى تعبر بصدق عن مدى رضاك العام عن نظام المعلومات فى منظمتك . (برجا اختيار اجابة واحدة, من السؤال 56 الى السؤال 59)

الرضا العام عن نظام المعلومات					
أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	56- يعتبر نظام المعلومات كفاء فيما يتعلق بتلبية احتياجاتك من المعلومات الخاصة بمهامك الوظيفية
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	57- يعتبر نظام المعلومات فعال فى فى انجاز العمليات الادارية فى منظمتك
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	58- يعتبر نظام المعلومات مؤثر على العمليات الادارية فى منظمتك
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	59- بصفة عامة, أنت راضى عن نظام المعلومات غى منظمتك

القسم الثامن: أرجو اختيار الاجابة التى تدل على مدى تأثير نظام المعلومات فى منظمتك على مهامك الوظيفية. (أرجو اختيار اجابة واحدة لكل سؤال, من السؤال 60 الى السؤال 69)

أوافق بشده	أوافق	لا يوجد رأى	لا أوافق	لا أوافق بشده	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	60- باستخدامك لنظام المعلومات, استطعت انجاز الكثير من مهامك الوظيفية بدرجة أكبر من لو لم تستخدم نظام المعلومات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	61- أدى نظام المعلومات الى تقليل الوقت اللازم لانجاز مهامك الوظيفية
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	62- أدى نظام المعلومات الى زيادة الانتجية الوظيفية
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	63- ساعدك نظام المعلومات على تطبيق طرق جديدة و متطورة لانجاز مهامك الوظيفية
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	64- ساعدك نظام المعلومات على تلبية متطلبات العملاء
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	65- ساعدك نظام المعلومات على تحسين خدمة العملاء

66-	ادى نظام المعلومات الى زيادو رضا العملاء	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67-	ساعد نظام المعلومات على تحسين أو تطوير الاشراف الادارى	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68-	ساعد نظام المعلومات الادارة العليا على ضبط أو الاشراف على الاداء الوظيفى	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69-	ساعد نظام المعلومات الادارة العليا على ضبط أو الاشراف على العمليات الادارية	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

القسم التاسع: معلومات عامة . (أرجو اختيار اجابة واحدة لكل سؤال, من السؤال 70 الى السؤال 77)

70- ما اسم وظيفتك

71- كم المدة التى قضيتها فى هذه الوظيفة؟ (سنوات) (شهور)

72- الجنس: () أنثى () ذكر

73- كم عمرك؟ () أقل من 20 () من 20 الى 29 () من 30 الى 39 () من 40 الى 49 () أكبر من 45

74- المستوى التعليمى:
() أقل من ثانوية عامة () ثانوية عامة () ثانوية عامة و معهد () بكالوريوس
() ماجستير () دكتوراه

75- كم عدد السنوات التى قضيتها فى العمل فى القطاع المصرفى؟
() أقل من سنة واحدة () من 1 الى 5 سنوات () من 6 الى 10 سنوات () من 11 الى 15 سنة () من 16 الى 20 سنة
() من 21 الى 25 سنة () أكثر من 26 سنة

76- كم عدد السنوات التى قضيتها فى العمل فى البنك الحالى؟
() أقل من سنة واحدة () من 1 الى 5 سنوات () من 6 الى 10 سنوات () من 11 الى 15 سنة () من 16 الى 20 سنة

() من 21 الى 25 سنة () أكثر من 26 سنة
77- كم المدة التى قضيتها فى العمل فى أنظمة المعلومات (الكمبيوتر) ؟ (سنوات) (شهور)

إذا رغبت أن تضيف أى اضافات أو تعليقات سواء عن موضوع البحث أو عن قائمة الاستقصاء ,
برجاء استخدام الجزء التالى و المخصص لهذا الغرض .

إذا رغبت فى الحصول على نسخة من ملخص نتائج قائمة الاستقصاء (الدراسة الميدانية) للبحث ,

برجاء التكرم بكتابة عنوانك البريدى .

نهاية قائمة الاستقصاء

Appendix C: Questions for IS practitioners of Egyptian banks

Telephone semi-structured interview

1. What kind / kinds of information system do you have in your bank organisation?
2. Have you any information system used by managers where usage is voluntary?


Will you please answer the remaining questions with respect to this / these systems:

3. What are the main concerns you have faced during and after installing your system?
4. After installing the information system, what do you think, in your opinion, are the main factors that affect usage of the system and satisfaction with it?
5. Do you think that the department managers and /or division managers are satisfied with the system?
6. What do you think the main problems are that affect the managers' satisfaction with the system?
7. What do you think the main problems are that affect the managers' usage of the system?
8. In your opinion, do you think that there are some problems that relate to the system itself or to the managers?
9. In your opinion, what should top management do to make sure that systems are implemented effectively so that they are used as intended and give satisfaction?
10. Do you think that the service quality of the IS department / employees might have an effect on system usage or satisfaction with the system?
11. How do you normally take into account opinions/comments of department managers and / or division managers when modifying or developing the system?
12. How do you think the quality of the information the system provides has an effect on system usage?
13. How do you think the quality of the information the system provides has an effect on satisfaction with the system?
14. How do you think the quality of the system itself has an effect on system usage?
15. How do you think the quality of the system itself has an effect on satisfaction with the system?
16. How do you think that age, organisational level, tenure in the job, training, duration of system use, and education have an effect on system usage and user

satisfaction? (This last question to be asked if managers respond too briefly, with only one variable taken each time).

Letters of approval from some participating banks

Appendix D: Letter of approval from Faisal Islamic Bank

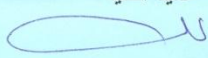

كلية التجارة
مكتب المحاسبة

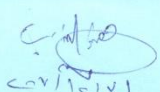
الاسكندرية في : / / ٢٠٠

السيد / مدير بنك فيصل الإسلامي
تحية طيبة وبعد ...

أتشرف بالإفادة أن السيدة / صفاء أحمد محمود حسين - تشغل وظيفة مدرس مساعد بقسم إدارة الأعمال - بكلية التجارة - جامعة الإسكندرية .
رجاء التكرم باتخاذ اللازم نحو تسهيل مهمتها في جمع البيانات والمعلومات الخاصة في مجال دراستها لمرحلة الدكتوراه .
علماً بأن عنوان رسالة الدكتوراه هو :
" An Analysis of Factors affecting Information system Success in the Egypt Banking Industry " .

وتفضلوا بقبول فائق الاحترام ...


عميد الكلية

أ.د. اسماعيل ابراهيم جمعة


٢٠٧/١٤١٢١

Alexandria : El Shatby P.O. Box : 21526
Tel : 03/4815555 Tel Fax : 03/4865655

الاسكندرية : بريد الشاطبي ص.ب : ٢١٥٢٦
تليفون : ٠٣/٤٨١٥٥٥٥ فاكس : ٠٣/٤٨٦٥٦٥٥

Appendix E: Letter of approval from Cairo Barclays Bank



كلية التجارة
مكتب العميد

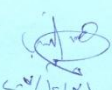
الاسكندرية في : / / ٢٠٠

السيد / مدير بنك القاهرة باركليز
تحية طيبة وبعد ...

أتشرف بالإفادة أن السيدة / صفاء أحمد محمود حسين - تشغل وظيفة مدرس مساعد بقسم إدارة الأعمال - بكلية التجارة - جامعة الإسكندرية .
رجاء التكرم باتخاذ اللازم نحو تسهيل مهمتها في جمع البيانات والمعلومات الخاصة في مجال دراستها لمرحلة الدكتوراه .
علماً بأن عنوان رسالة الدكتوراه هو :
" An Analysis of Factors affecting Information system Success in the Egyptian Banking Industry " .

وتفضلوا بقبول فائق الاحترام ...


عميد الكلية

أ.د. اسماعيل ابراهيم جمعة


٢٠٠١/١٢/٢١

Alexandria : El Shatby P.O. Box : 21526
Tel : 03/4815555 Tel Fax : 03/4865655

الإسكندرية : بريد الشاطبي ص.ب : ٢١٥٢٦
تليفون : ٠٣/٤٨١٥٥٥٥ فاكس : ٠٣/٤٨٦٥٦٥٥

Appendix F: Letter of approval from HSBC Bank


كلية التجارة
مكتب العميد

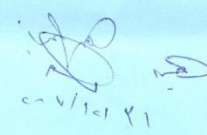
الاسكندرية في : / / ٢٠٠

السيد / مدير بنك HsBC
تحية طيبة وبعد ...

أنشرف بالإفادة أن السيدة / صفاء أحمد محمود حسين - تشغل وظيفة مدرس مساعد بقسم إدارة الأعمال - بكلية التجارة - جامعة الإسكندرية .
رجاء التكرم باتخاذ اللازم نحو تسهيل مهمتها في جمع البيانات والمعلومات الخاصة في مجال دراستها لمرحلة الدكتوراه .
علماً بأن عنوان رسالة الدكتوراه هو :
" An Analysis of Factors affecting Informtion system Success in the
Egyptian Banking Industry " .

وتفضلوا بقبول فائق الاحترام ...

عميد الكلية
أ. د. اسماعيل ابراهيم جمعة


٢١ / ١٠ / ٢٠٠٦

Alexandria : El Shatby P.O. Box : 21526
Tel : 03/4815555 Tel Fax : 03/4865655

الاسكندرية : بريد الشاطبي ص.ب : ٢١٥٢٦
تليفون : ٠٣/٤٨١٥٥٥٥ فاكس : ٠٣/٤٨٦٥٦٥٥

Appendix G: Letter of approval from National Bank of Egypt



كلية التجارة
مكتب العميد

الاسكندرية في : / / ٢٠٠

السيد / مدير البنك الأهلي المصري

تحية طيبة وبعد ...

أشرف بالإفادة أن السيدة / صفاء أحمد محمود حسين - تشغل وظيفة مدرس مساعد بقسم إدارة الأعمال - بكلية التجارة - جامعة الإسكندرية .
رجاء التكرم باتخاذ اللازم نحو تسهيل مهمتها في جمع البيانات والمعلومات الخاصة في مجال دراستها لمرحلة الدكتوراه .
علماً بأن عنوان رسالة الدكتوراه هو :
" An Analysis of Factors affecting Information system Success in the Egyptian Banking Industry " .

وتفضلوا بقبول فائق الاحترام ...

عميد الكلية

أ. د. اسماعيل ابراهيم جمعة

Alexandria : El Shatby P.O. Box : 21526
Tel : 03/4815555 Tel Fax : 03/4865655

الإسكندرية : بريد الشاطبي - ص. ب : ٢١٥٢٦
تليفون : ٠٣ / ٤٨١٥٥٥٥٥ فاكس : ٠٣ / ٤٨٦٥٦٥٥

Appendix H: Letter of approval from Cairo Bank



كلية التجارة
مكتب العميد

الاسكندرية في : / / ٢٠٠

السيد / مدير بنك القاهرة

تحية طيبة وبعد ...

أتشرف بالإفادة أن السيدة / صفاء أحمد محمود حسين - تشغل وظيفة مدرس مساعد بقسم إدارة الأعمال - بكلية التجارة - جامعة الإسكندرية .
رجاء التكرم باتخاذ اللازم نحو تسهيل مهمتها في جمع البيانات والمعلومات الخاصة في مجال دراستها لمرحلة الدكتوراه .
علماً بأن عنوان رسالة الدكتوراه هو :
" An Analysis of Factors affecting Information system Success in the Egypt Banking Industry " .

وتفضلوا بقبول فائق الاحترام ...

عميد الكلية

أ.د. اسماعيل ابراهيم جمعة

Alexandria : El Shatby P.O. Box : 21526
Tel : 03/4815555 Tel Fax : 03/4865655

الاسكندرية : بريد الشاطبي ص.ب : ٢١٥٢٦
تليفون : ٠٣/٤٨١٥٥٥٥ فاكس : ٠٣/٤٨٦٥٦٥٥

Appendix I: Letter of approval from Misr Bank



كلية التجارة
مكتب العميد

الاسكندرية في : / / ٢٠٠٠

السيد / مدير بنك مصر

تحية طيبة وبعد ...

أتشرف بالإفادة أن السيدة / صفاء أحمد محمود حسين - تشغل وظيفة مدرس مساعد بقسم إدارة الأعمال - بكلية التجارة - جامعة الإسكندرية .
رجاء التكرم باتخاذ اللازم نحو تسهيل مهمتها في جمع البيانات والمعلومات الخاصة في مجال دراستها لمرحلة الدكتوراه .
علماً بأن عنوان رسالة الدكتوراه هو :
" An Analysis of Factors affecting Informtion system Success in the
Egyptian Banking Industry " .

وتفضلوا بقبول فائق الاحترام ...

عميد الكلية

أ.د. اسماعيل ابراهيم جمعة

٢٠٠٧/١٥/٢١

Alexandria : El Shatby P.O. Box : 21526
Tel : 03/4815555 Tel Fax : 03/4865655

الاسكندرية : بريد الشاطبي ص.ب : ٢١٥٢٦
تليفون : ٠٣/٤٨١٥٥٥٥ فاكس : ٠٣/٤٨٦٥٦٥٥